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ELECTRICAL WORLD

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ITHACA A.I.E.E. CONVENTION

Ten technical sessions covering nearly 40 subjects and conferences dealing with fourteen other topics afforded electrical engineers the latest thinking on a variety of important problems and the way they are being handled. In this issue "Electrical World" editors have assembled their impressions of this vast array of discussions, orienting them so they may be viewed in proper perspective.

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SALES MOUNT IN GEORGIA

By L. W. W. MORROW

Confronted with rate cuts, higher taxes, T.V.A. yardsticks and other troubles disturbing to morale and earnings, Georgia Power, back in 1933, promptly and courageously adopted an aggressive selling program. The results should be a stimulus to any companies in harassed positions.

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RURAL ELECTRIFICATION

Interview with MORRIS LLEWELLYN COOKE
Director Rural Electrification Administration

Defines scope of his $100,000,000 program and indicates the fashion in which he hopes to make possible the most remarkable increase in sales of rural power in the history of the electrical industry.

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HOLDING COMPANY STEWARDSHIP

Interview with W. RODMAN PEABODY
Vice-President Western Massachusetts Companies

•

THYRATRON MOTORS APPLIED

By PHILIP SPORN and G. G. LANGDON
American Gas & Electric Company

What led to the investigation of this use of electronic tubes for variable-speed drives in power stations—Features, characteristics and the possible future.

JULY 6
1935

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ELECTRICAL WORLD

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VOLUME 105 . . . NUMBER 14

Contents Copyrighted, 1935, by McGraw-Hill Publishing Company, Inc.

ELECTRICAL WORLD—Published every other Saturday. Price 25 cents a copy. Subscription rates: United States, Mexico, Central and South American countries, $4 a year; Canada, including duty, $5 a year; all other countries, $6 or 24 shillings, a year. Entered as second-class matter, January 20, 1907, at Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U.S.A.

Branch Offices: 510 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Greenville, S. C.
Printed by The Schweinler Press, N. Y.

McGRAW-HILL PUBLISHING COMPANY, INC.
330 West 42d Street, New York, N. Y.

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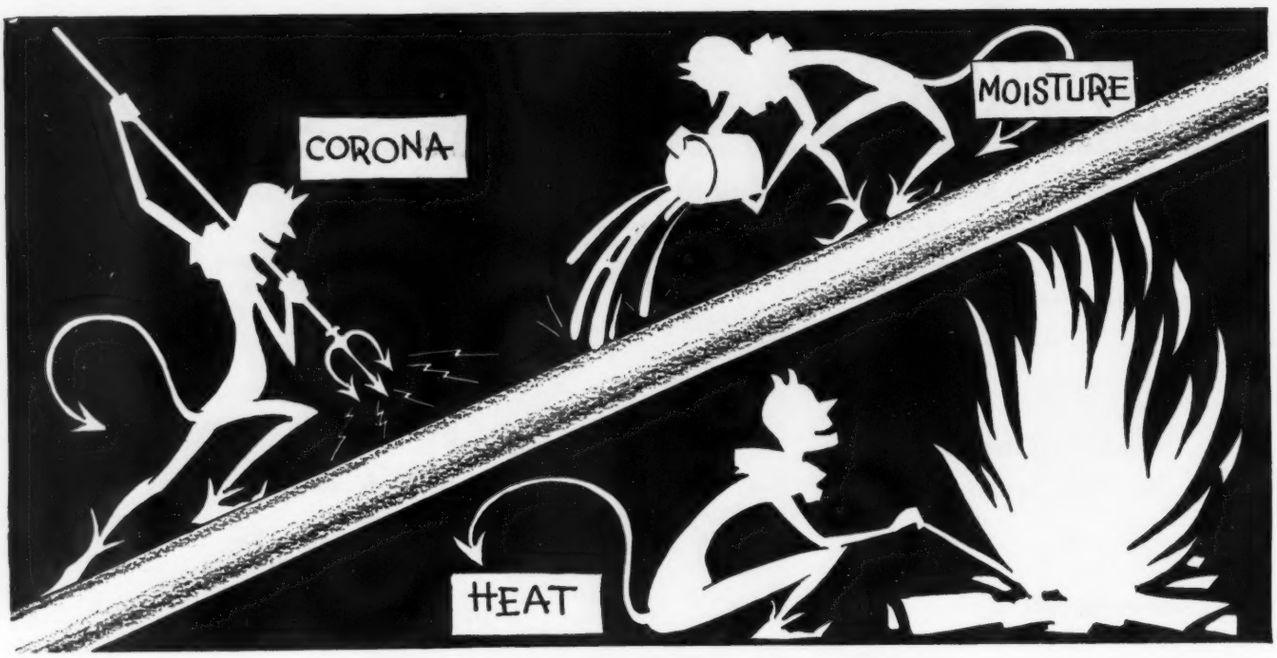

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LETTERS TO THE EDITOR

Bushing Gaps for Impulse Flashover

To the Editor of ELECTRICAL WORLD:

As the A.I.E.E. Test Code calls for impulse flashover of transformer bushings during impulse tests on transformers, it is quite necessary that transformer bushings have more definite impulse voltage characteristics than such bushings have had in the past.

Numerous tests have shown that the impulse flashover voltage of identical bushings varies over quite a wide range, this variation being more pronounced for long waves than for short waves.

Another source of variation in impulse flashover voltage of bushings of the same rating is the variation in the arcing length, which is due to the fact that it is not practical to manufacture porcelains of exactly the same length. For this reason a tolerance in dimensions is allowed.

It has been found that the impulse flashover voltage of bushings can be made more definite by the addition of small rod gap electrodes attached to the cap and to the support ring. These electrodes provide definite points from which the flashover can be initiated. They consist of a small rod or strap projecting upward from the support ring and a small strap projecting outward from the cap.

The erratic impulse flashover voltage of bushings without gaps previously mentioned is greatest for long waves such as the 1.5 x 40 full wave. As the time required to produce flashover is decreased either by applying a steeper wave or by applying an overvoltage with the 1.5 x 40 wave, the variations decrease, and for very steep waves become of the same order as occur on a rod gap of the same spacing as that corresponding to the arcing length of the bushing. The action or benefits of the point-gap electrodes is, therefore, more pronounced with long waves. In fact, with very steep wave fronts the arcing may occur on some other part of the bushing unless the length of the gap is considerably less than the arcing length of the bushing.

These electrodes accomplish several purposes:

1. Provide an easy means of adjusting the arcing distance, regardless of variation in length of porcelain, to give standardized flashover values.
2. Produce more nearly uniform flashover values in a bushing of a given rating. In fact, these electrodes keep the impulse flashover voltage within the variations obtained with a plain rod gap.
3. Make it possible to provide the proper impulse flashover level for oversize bushings having a creepage distance greater than normal. This is sometimes desirable for installations where adverse surface conditions exist, such as salt, dirt, chemical deposits, etc.
4. The projecting electrodes tend to protect the porcelain in case power current follows lightning flashover in service.

The practice of equipping General Electric transformer bushings with gaps on the cap and support ring was initiated two years ago and has now been extended to all standard transformer bushings.

V. M. MONTSINGER
E. D. EBY,
Central Station Department,
General Electric Company,
Pittsfield, Mass.

•

Status of P.W.A. Projects

In the article on the status of P.W.A. projects in the ELECTRICAL WORLD of June 22, page 35, reference was made to the Congressional Record. The date of the latter was erroneously printed as April 19. It should have been April 29. For further aid to those wishing to consult the complete list we now add that it appeared under "Extension of Remarks" by Hon. W. D. McFarlane, on pages 6830 to 6837. It gives dates and amounts for each project in the several groups mentioned in the article.

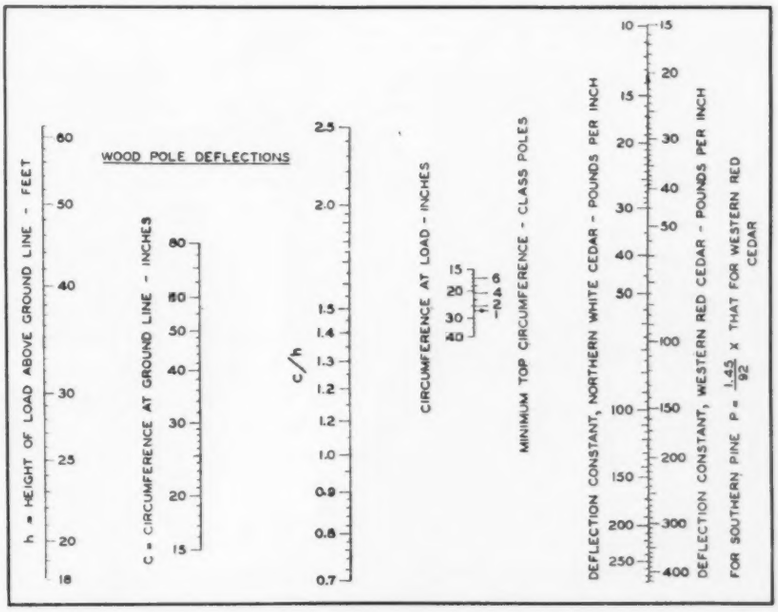
For Calculating Deflection of Any Pole

To the Editor of ELECTRICAL WORLD:

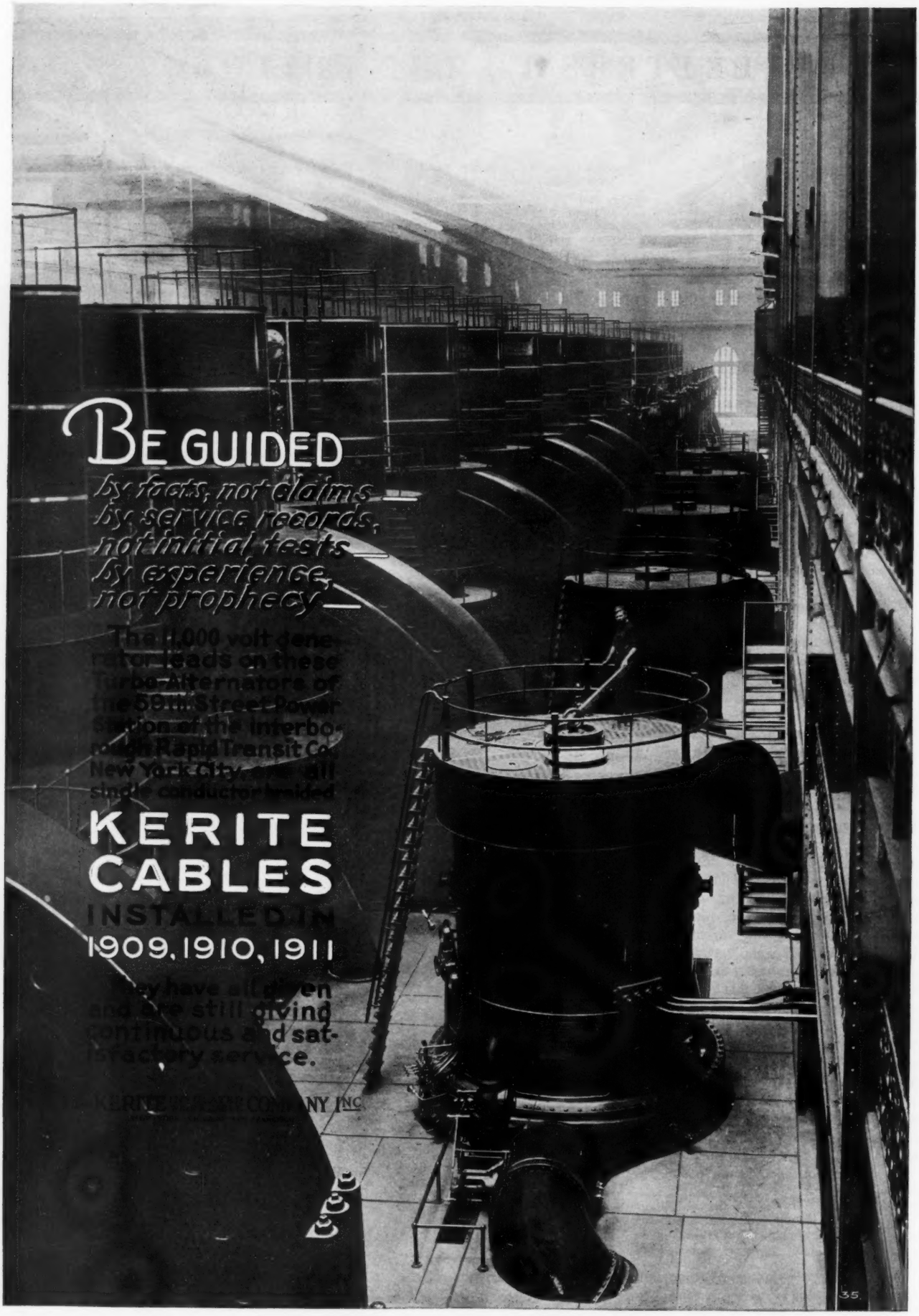
In the April 27, 1935, issue B. E. Ellsworth gives a formula (page 62) for pole deflection. This appears to be an empirical modification of the formula for a cylindrical pole and should be quite useful in certain ranges of pole size. However, in developing the method which we have used for several years in figuring unguyed-pole spans, it became necessary to find the formula for any pole. By working from the basic formula for beam deflections, allowing for pole taper and integrating over the whole length of the pole, the following formula was derived: Deflection $= W L^3 \div (K\ C_t\ C_b^3)$ where the letters have the same meaning as in Ellsworth's formula, viz: W = load at top of pole; L = length from ground line to load; C_t = pole circumference at top; C_b = pole circumference at ground line; K = constant depending on modulus of elasticity. For Western red cedar, $K = 0.92$; for Northern, $K = 0.61$; for Southern pine, $K = 1.45$.

This formula, besides having the theoretical background, has been checked by more than 50 tests on widely different poles and works into the accompanying nomogram.

MYRON ZUCKER,
Detroit Edison Company,
Detroit, Mich.


WOOD POLE DEFLECTIONS
h = HEIGHT OF LOAD ABOVE GROUND LINE - FEET
C = CIRCUMFERENCE AT GROUND LINE - INCHES
c/h
CIRCUMFERENCE AT LOAD - INCHES
MINIMUM TOP CIRCUMFERENCE - CLASS POLES
DEFLECTION CONSTANT, NORTHERN WHITE CEDAR - POUNDS PER INCH
DEFLECTION CONSTANT, WESTERN RED CEDAR - POUNDS PER INCH
FOR SOUTHERN PINE P = 1.45/.92 X THAT FOR WESTERN RED CEDAR

Wood-pole deflection constants for three kinds of poles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MANAGEMENT • ENGINEERING • OPERATION • UTILIZATION

PUBLISHED EVERY OTHER SATURDAY

JULY 6, 1935

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The A.I.E.E. Convention

ELECTRICAL engineering is the foundation upon which the electrical industry builds. It is vital to the health of the industry to have a strong and progressive engineering staff. That this exists was proved by the attendance of 1,000 at the A.I.E.E. convention at Cornell University last week. The papers, the discussions and the conferences were replete with new ideas and new developments.

From the Boulder Dam project to the steel mill, engineering is in a state of flux and development, with an astonishing production of new and improved equipment, methods and designs. Engineers and research men are making old installations and practices obsolete and are enabling the industry to render a better and less expensive service. It is encouraging to record and approve the great engineering progress made during the depression.

SEVERAL innovations marked this convention. The holding of the meeting at a university was a departure from past practice that should be encouraged. Educators and engineering practitioners need to develop intimate relations and mutual understandings, and this meeting was stimulating and informative to both groups. Another departure was the holding of several round-table conferences on current engineering problems and developments. This brings into the institute all groups of engineers and provides a new outlet for the expression of engineering ideas of benefit to the industry.

Social, economic and legislative aspects of the profession also entered into the program. A realization exists that important developments are occurring in the relation of the institute to national affairs and to other organizations. No longer can a professional group deal solely with technical matters. It must enlarge its activities to provide a forum for engineers to discuss all their relations to society. This new trend is quite noticeable in the institute.

There is every reason for engineers to apply their method of analysis and attack to some of the broader problems of the world in which they work. Engineering is the dominating motivation behind all business and industry and engineers need to understand the effects and implications of their contributions. It is a good thing for the country and for engineers to find that the professional societies are broadening their activities to incorporate social and economic discussions.

IT IS a tribute to the officers of the A.I.E.E. that over the years it has grown and expanded wisely and safely. It has decentralized into sections and branches to reflect local interests and provide for the active participation of all members, yet it has held to sound policies in organization and finance so that it is ready for renewed growth with no necessity for priming and trimming. Engineers in the institute are professional men. They are individuals and not representatives of companies that employ them. This eliminates the commercial and business influences found in trade associations and creates an attitude and an atmosphere that are wholly professional. This attitude of policy has proved its value in past years and the new and broader policies adopted by the institute will succeed or fail in the degree that former policies are followed.

In the technical sessions the papers and discussions were of great interest and variety and this issue gives a condensed version of the meetings. In all fields of electrical activity there is progress. Engineering is growing at a rapid rate and the often-heard statement that engineering is finished is false and misleading. The electrical engineers are making bombs that disturb the *status quo* and the other groups in the industry should encourage them to build, invent and plan. They are known by their works, and this meeting was a splendid exhibit to indicate the vitality of the profession.

·TRENDS·

Saying It With Kilowatts

PREDICTIONS of new records in energy output during 1935 are coming true. June operations were on a higher level than in any previous year. The rise came in the first week of the month and the lead now appears to be definitely established. Throughout the first half year the production curve has been consistently higher than in 1929, with a few exceptions. In the latter half of that year industrial activity began to taper off. Nevertheless, the winter output of electrical energy was the highest ever attained. Since that time new applications have been made. To make 1935 a record-breaker it is only necessary that the lead over 1929 shall continue.

Honor to Edison

ANNOUNCEMENT of the incorporation of the Thomas Alva Edison Foundation last week brings to a focus plans for creating memorials to the great inventor. It is proposed to have a national Edison Memorial Week this fall that will combine celebrations in honor of Mr. Edison and popular subscriptions to raise funds for suitable Edison memorials. Since the death of Mr. Edison studies have been under way to unite all efforts on memorials and the new foundation represents all interests and the final conclusions for action. Mr. Edison has an undying place in history and the electrical industry will co-operate heartily in this responsible endeavor to commemorate his name and his work.

"In the Dog House"

SEVEN power companies on the Pacific Coast have distributed to employees a folder starting "Our industry is in the Public Dog House. It's time we came out in the open!" It points out that "you are your company" and that justice and self-respect demand that every employee be armed with the facts to silence every critic that he meets. Good stuff! Facts nail gossip and every company should make the nailing easy for all its people.

Another Unsolvable Problem Cracks

HOW the viewpoint changes. A short time ago the minimum bill customer was looked upon as an inescapable curse. He couldn't buy appliances, so he would not consume enough to pay his way. Now comes the idea of renting him a small lift-top refrigerator and his bill goes up, say, $1.25 a month. He won't buy. But he will rent. And it pays. And there you are. More and more companies are doing it.

Wages and Hours

A NEW endeavor to control wages and hours is contained in the Walsh bill recently introduced in Congress. This gives sweeping authority for President Roosevelt to fix minimum wage rates and maximum hours of employment under all government contracts for materials and construction. This provision applies to all political subdivisions which obtain grants or loans of government funds. All government agencies have already been notified that all bids must contain the provision that the contractor will abide by the provisions of this bill when and if passed. This creates turmoil and uncertainty. Many claim the bill is unconstitutional. But the fact remains that it is proposed and has a good chance of passing and that present bids must have the "if" provision.

It Pays to Sell

THE story of Tennessee Electric Power in the last issue and of Georgia Power in this issue shows that it pays to sell energy and appliances at an unprecedentedly high rate. Low-cost business comes only from volume business. To add from 100 to 200 kw.-hr. to the average domestic use in one year has been the dream of the industry. These stories show that this can be done and that it pays to do it. But make no mistake. It takes money, man-power and an enthusiastic organization to get the results. Low rates alone will not sell business rapidly. Neither will low-priced appliances. It takes a business operation with a complete personnel and organization to get results. The data from these properties show how as well as why they get business at a low unit cost.

Add Highway Lighting to Rural

SOMEBODY is missing a good bet. The federal and utility rural electrification projects should be tied in with highway lighting. This will help carry the costs of the rural projects and, in addition, is the one thing needed to make our modern roads safer and more useful. But no one appears to suggest definite plans to tie these two projects together. It is high time that the electrical industry sponsored this movement. The aid of the automotive, good roads and safety groups could be had and the automobile driving public would acclaim the proposal. What appears to be missing is some one to start the action.

Power Sales Opportunities

THE time is opportune for a revival of activities in power sales. Business is coming back. Modern equipment is available. Banks and the F.H.A. are ready to make loans. There is a demand for goods in a highly competitive market. Recent studies show that industrial plants are buying and are going to buy electrical equipment this year. However, a new method and technique in power sales is necessary to capitalize upon this opportunity. The power salesman must know the modern equipment available and the fundamental operations in each industrial enterprise. He must be a competent and informed consultant in his approach if he expects to get best results. To get load and

The Editors Use a Spotlight on Current Happenings

to build good will he must attain to these new specifications for success. Sample instances show that this approach brings results.

F.H.A. Cheers Manufacturers

NEMA expresses enthusiasm over the prospects for business through the Home Modernization Program. In Knoxville, for instance, the utility sent out 23 men to canvass 22,000 homes to sell appliances and lighting. One salesman in one day sold refrigeration plus other appliances or wiring and fixtures to the owners of nine homes by arranging for the tenant to pay $5 a month more rent. Similar good reports are coming from other cities. The manufacturers think it is going to bring a lot of extra sales.

Bulk Sales to Farms

AS A part of the R.E.A. projects pressure will be put on farmers to buy all the electrical equipment they can use in one contract at the outset of their use of electricity. It is planned to give the farmers very liberal loan provisions, at 3 per cent interest or less. Plumbing manufacturers are awake to this opportunity and are organizing to go after this business. Electrical manufacturers and utilities should do the same. Standard equipment layouts, demonstrations and traveling exhibits are good methods to introduce for selling the farmers the idea. Each local electrical group can well study the possibilities of organized effort to sell this single-contract business.

Television Load

WITH Europe rapidly growing television conscious and American interests awakening to the industrial possibilities, a new prospect for domestic load appears on the horizon. The Department of Commerce has sent a man to Europe to study this trend. And some day, maybe, these sets will be as common as radios now are. But we hope we'll never see them $9.98 in a drug store window.

Hope for Traveling Eyes

NOW Cleveland has a "Better Sight" street car with an average of 25 foot-candles of glareless illumination —six times the usual light. This is progress! Most Pullman cars are comfortable for reading, but too many day coaches, commuters' trains and street cars are still destroying eyesight. Power companies with street railways should lead the way in this reform.

Modernize Oil Breakers

ONE of the developments of the depression is a vast improvement in oil breakers. These are key devices in utility and industrial service and the return of load makes it advisable to look at breaker modernization. Most oil breakers in service are at least ten years old, and in respect to capacity, speed and maintenance cost are relatively unsatisfactory. These breakers can be modernized at small cost. It is not necessary to buy new breakers. Engineers at this time will do well to study the breakers on each installation with the idea of bringing them up to the standards now possible in capacity and performance.

Politics vs. Economics

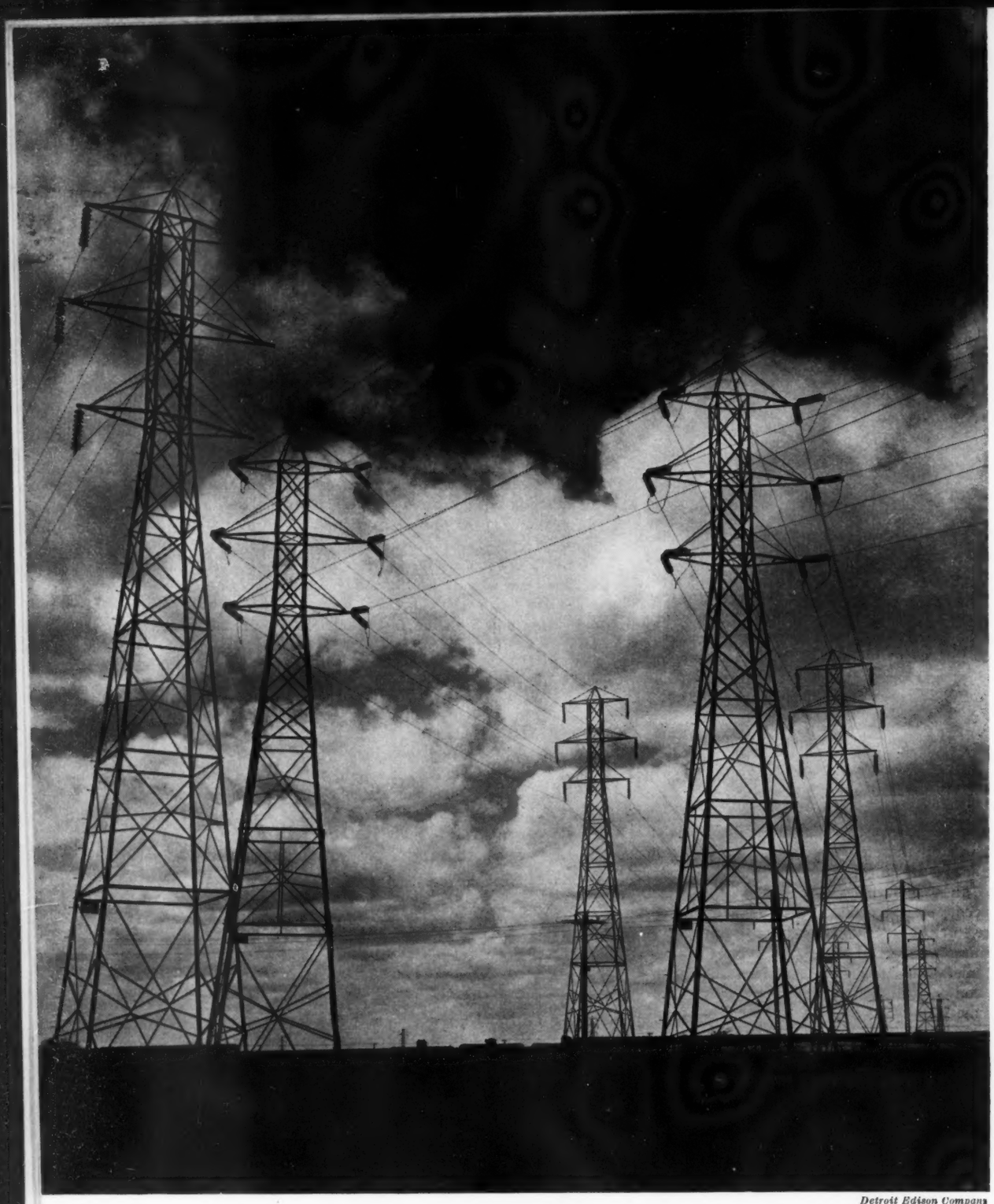
BOONEVILLE'S village electric light plant made a profit that was applied to reducing local taxes. The Public Service Commission said it should cut rates. The Supreme Court at Albany now rules that the town can do what it wants with its profits so long as charges are not excessive. The question will probably be taken to Washington and a number of important principles in rate making will be defined. Other municipal utilities please note.

Saving by Rebuilding

FUEL efficiency better than 13,000 B.t.u. per kw.-hr. in a plant costing less than $100 per kw. will be achieved by the Detroit Edison Company in its rehabilitation of the Conners Creek station. The capacity will be nearly doubled, using from 180,000 kw. to 330,000 kw. without crowding. The computed new unit book value, $92, is almost identical with the former $91.50 but the rate of fuel consumption will be greatly decreased from the 19,000 B.t.u. average of the old plant. Rebuilding permits various economies compared with the construction of an entirely new plant. The Detroit company has given a specific instance of how it can be done.

England Steps Forward

AS AN experiment, the electrical industry of Great Britain has just held its first national convention, in which all classes of electrical men came together. Now a National Council of the Industry has been formed, with a broad constructive program. It includes standardization of voltages, methods of charging for energy and such equipment as plugs and sockets, the drafting of a minimum wiring code, the establishment of a national testing laboratory, the organization of "local co-operative development circles" and other progressive purposes. So England steps well ahead of electrical co-operation in America by uniting all branches of the industry to do the common building job.



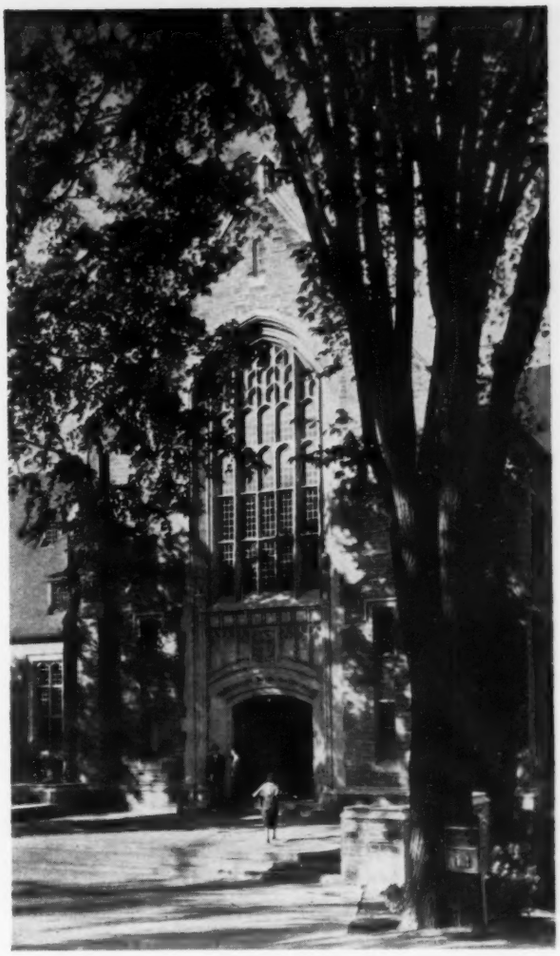
Detroit Edison Company

TOWERS OF STRENGTH

Here is the transmission line in its modern function as the integrator of independently capable parts into a more flexible and economic single electric system. This function is distinct from the popular idea of transmission, which is now approaching technical obsolescence—carrying large blocks of power over long distances from remote points of generation. Renewed activity in transmission of this type may be expected with present indications of increased loads.

A.I.E.E. Meets in Ithaca

Technical Sessions at Summer Convention of the American Institute of Electrical Engineers Attract 1,000 —Cornell University Acts as Host— Meyer Elected President



AN INNOVATION for electrical engineers was the holding of the A.I.E.E. summer convention at Cornell University. Nearly 1,000 registered and lived in the college dormitories last week. The meeting was noteworthy in attendance and in the number of technical meetings and conferences. Entertainment and social features added to the interest.

At the opening meeting on Monday Dr. A. R. Mann, provost of the university, welcomed the delegates and stressed the mutual benefits that accrue to education and industry through more intimate association and co-operation. The business meeting of the institute followed, including the acceptance of the report of the board of directors and the announcement of the election of E. B. Meyer as the new president of the institute.

During the year ended April 30, 1935, there were 521 section meetings held with a total attendance of 73,381. In the same period 986 branch meetings were held with an attendance of 36,629. These were record-breaking figures and attested to the vitality of engineering. The A.I.E.E. finances were in splendid shape, according to the annual statement, and there has been an increase in membership during the year and the total is now 14,253.

The Lamme Medal was presented to Henry E. Warren for his achievements in developing electric time and the address of President Johnson was read by Vice-President Bonney. Mr. Johnson's illness prevented his attendance at the meeting.

As is customary, officers and delegates of sections and branches met together to discuss institute affairs during the first day of the meeting. President-elect E. B. Meyer talked at both meetings and urged that the aid and co-operation of all members be given to help guide the institute officers in the coming year.

A new departure in institute affairs was the holding of technical conferences. During this meeting specialists met together in round-table discussions and these meetings were successful and well attended. Conferences held included: Problems of the Student and Cadet Engineer, D.-C. Test Code, Transformers, Research on Insulating Oils, Noise, Mercury-Arc Rectifiers, Dielectric Theories, Circuit Breaker Standards, Reactance Coefficients of Synchronous Machines, Curricula and Methods, Research in Schools, Distribution Transformer Protection, Tensor Analysis and Conductor Vibration. No formal papers were presented at these conferences, but general discussion as well as topical discussions were used to bring out current trends and developments.

Power generation developments

At the session on power generation on Tuesday morning three good papers were presented and discussed. Boulder Dam plant was described by L. N. McClellan, the Huntley station in Buffalo by H. M. Cushing and the rehabilitation of Conners Creek in Detroit by R. E. Greene. The enormous size of the Boulder project was clearly brought out by Mr. McClellan, as well as the new and interesting developments in design and equipment used. Huntley station is an unusual design to use with a hydro system and the Conners Creek plant is a rebuilt station at a load center.

In discussing the Huntley station, Marion Penn (Public Service Electric & Gas, N. J.) said the station was designed to performance specifications and was interesting in that it was a low-cost plant that gave splendid thermal performance. To get less than 14,000 B.t.u. per kilowatt-hour on a capacity factor of 25 per cent was a splendid achievement. He pointed out that the per cent of equipment unavailability was about 19. The data on starting time illustrated the necessity of keeping turbine rotors turning by use of motors.

C. M. Gilt (Brooklyn Edison) said some of the troubles with two-winding machines was the tripping of network relays on unbalance and at light and heavy loadings. The adjustment of the number of feeders seemed the best way to adjust loads. In Brooklyn it has not been found necessary to use two breakers per feeder. In his discussion of Conners Creek he said it was usually cheaper to build an entirely new station than to try to rebuild an old one, but the conditions were special in Detroit and the new capacity was obtained at about $92 per kilowatt.

J. R. Baker (Pennsylvania Water & Power) said the performance and cost data onthe Huntley station raised the question as to whether power plant designers had exhausted the economic possibilities of medium-pressure, medium-temperature plants before going to high-pressure, high-temperature installations. He said the station was notable for a compact switch house, the central locations of transformers and buses and a compact boiler house.

H. C. Albrecht (Philadelphia Electric) doubted that a 100-ft. span was large enough for a 200,000-kw. turbine, as at Philadelphia the span for a 160,000-kw. unit was 120 ft. He also suggested that direct-connected exciters be used and the auxiliary power supply transformers be connected directly to generator leads without oil breakers. He also suggested the use of 2,300 volts for all motors above 25 hp. and 220 for those below this rating.

Superimposed high-pressure units questioned

H. W. Eales (Byllesby) advocated direct-connected exciters and insulated busbars. He thought 22,000-volt generators could have been used and thus permit the elimination of the auto-transformers in the Huntley plant. He uttered a word of caution in the use of the common neutral bus system.

C. A. Powell (Westinghouse) said the rehabilitation of Conners Creek was interesting in that many parts of the existing assembly could be used. He wondered, however, whether or not the statement is justified that high-pressure superimposed units would have resulted in higher maintenance and lower reliability. In any scheme of rehabilitation, if it is to be economical, considerable old equipment must be retained and the weak member may not be the main units. With superimposed turbines the life of the existing equipment enters the problem to no greater degree than it would were the station left at its original pressure. When the decision is made to replace the old boilers, the question of the old turbo-generators should be treated as a separate problem.

Mr. Powell said there was no advantage in going above 13,800 volts in generators except for large 200,000-kva. units. In large units currents cause trouble in steel buildings or reinforced buildings and the absence of these troubles may justify the cost of high-voltage machines. He commended the "split bus" scheme.

Noise analysis

Immediately ahead in the field of noise analysis and control is the task of getting the available instruments familiarized as working tools. Point measurement, added P. L. Alger, in opening the conference on noise, has reached a considerable degree of proficiency, the terminology is reasonably well clarified and there is the future task of integrating the noise for all directions in somewhat the manner of the spherical photometer. The complexity of the problem makes the approximations to such integration a difficult matter. Nevertheless, R. E. Greene (Detroit Edison) urged that working agreement be reached between noise performance when installed and the data found by the producer under non-reverberatory test conditions.

In discussing the manufacturers' side of the problem, K. B. Marvin (General Electric) and L. W. Chubb (Westinghouse) agreed there is a better chance to standardize field technique than to do the same for tests of noise in the design laboratory. All measurements are being made in sound-proof, noise-dampened rooms, but absorption does not extend down to the fundamental rotational frequencies and that causes some difficulties. Also, there is often a fivefold variation in noise in different directions and this points to the need of early agreement on the location chosen for single measurements in each particular type of apparatus. Such established location need not be the same for all kinds of apparatus, however.

How extensive noise measurements have become was indicated by data submitted by Dr. E. E. Free (E. E. Free Laboratories). He reported 44,000 measurements ranging from 110 decibels for an airplane down to 21 for open country on a windless night, all above the A.S.A. threshold of 10^{-16} watts per square centimeter. In general, he concluded that any noise below 50 db. is not harmful to humans, although it may be psychologically unpleasant to persons in irascible mood. J. S. Parkinson of the Johns-Manville Research Laboratories set the permissible level 5 or 6 db. below the average room noise level. In general, the resort to the damping palliative will effect a reduction of 5 to 10 db. He said candidly that the primary objective of the noise engineer should be to minimize the generation of noise and resort to wall absorption for the residual. This, in extreme instances, necessitates double and even triple walls in order to build the transmission loss up by increasing the absorbing mass per square foot in accordance with the formula, $T.\ L. = 10\ (3 \log m - 0.4)$.

Education and the profession

A description of the advanced course in engineering given at Schenectady was presented by Alan Howard on Wednesday. This course is made up of about 30 selected graduate engineers and is designed to teach them the fundamentals and how to apply them. It is essentially a problem course during the first year and the men are divided into electrical and thermal groups the second year, only to recombine in mechanical engineering studies the third year. In the discussion several professors approved the principle underlying the course in that it stressed fundamentals in science and tended to avoid specialization. Mr. Howard said the greatest weakness he found in graduates of the schools was their inability to apply their knowledge.

Dr. D. B. Steinman gave an address on the registration of engineers. Engineering licensing laws are now in operation in 33 states and pending in ten others. Since January 6 states have adopted these laws. This movement started in Wyoming in 1907 and is growing rapidly. More than 45,000 licensed engineers are now recorded in this country.

The underlying philosophy of the movement is that this legislative approach is the only way to advance the status of the profession and protect both it and the public from the incompetent and unethical people who may try to practice engineering. The only

practical way is to establish laws and get them enforced. Engineers should suggest the laws and help administer them to the advantage of the profession. Teeth have been put into the laws and enforcement is getting stronger and stronger. The principles applied in law and medicine to develop these professions are now being applied to engineering.

Oiled bearing practice for watt-hour meters

Whether oil is right or wrong for the lubrication of watt-hour meter bearings was answered by the Abbott-Goss paper with the positive conclusion that it does lengthen the accuracy life of the meter. With the disk loaded to five times normal weight and run at 30 times normal speed they accelerated the wear and found that a well-oiled jewel bearing under average conditions would cease increasing flattening of the pivot at about 0.0022 in. after 100,000,000 revolutions. Pressure initially at 172,000 lb. per square inch dropped meanwhile to 2,000 at the enlarged area of lubricated contact and there was no marked sacrifice in accuracy observed.

Agreement with the conclusions was contributed by L. D. Price (Public Service Electric & Gas Company) who also reported the continuance of extensive experiments with bearings and lubrication. He advocated the sealing of replacement jewels in moisture-tight capsules. This is to avoid the rusting of the pivot, which initially creates a polishing action, but later degenerates into a grinding process with devastating results to accuracy. Price further suggested the use of a non-metallic pivot with the additional possibility of adopting a less fluid lubricant.

New electrothermic instrument

Commenting on Professor Lincoln's proposed new thermal meter, Perry A. Borden of the Bristol Company (which made the Bourdon tubes for Lincoln's experiments) emphasized the degree to which the problem of the electrical instrument designer promptly became mechanical in nature as soon as the fundamental electrical characteristics have been established. He pointed out that the enormous pressure built up in the Bourdon tube as it uncoils under temperature rise and expansion of the liquid in it may also be transmitted to the support and other mechanism of the meter. Lincoln replied that he was confident these stresses were not serious and that he had at last devised a thermal demand meter which would be independent of power factor, temperature and wave form and also have a linear scale along with large margin of overcapacity. As designed, the new meter has about half the voltage in the heater coils of the 0.3 volt in the present thermal meter.

General Electric

Oil breakers for Boulder-Los Angeles line contribute to the possibility for transmitting power safely

Direct measurement of surge currents

Upward of 12,000 of the magnetic links used in conjunction with surge crest ampere determinations have been made in the last three years, W. W. Lewis of General Electric said in comment on the Foust-Henderson paper.

The towers of the following lines have been completely equipped, in some cases with four brackets and in the remainder of the cases with one bracket per tower: The Pennsylvania Power & Light Company's 220-kv., 65-mile Wallenpaupack-Siegfried line, the Appalachian Electric Power Company's 132-kv., 65-mile Glenlyn-Roanoke line, the Pennsylvania Water & Power Company's 220-kv., 70-mile Safe Harbor-Westport line and the Philadelphia Electric Company's 66-kv., 14-mile Philadelphia-Chester line.

The Pennsylvania Power & Light Company and the Appalachian Electric Power Company have equipped portions of their ground wire and counterpoise installations, also cross-arms and vertical lightning rods at some towers have been equipped.

Distribution-circuit lightning-arrester down leads have been equipped at about 1,000 locations in Chicago, Detroit, Boston and Atlanta.

The principal broadcasting towers in Eastern United States have been equipped with magnets. Miscellaneous applications have been made on station lightning arrester ground leads, lightning rod installations, etc., in various parts of the country.

Currents up to 100,000 amp. per tower have been measured and up to 220,000 amp. total in all the towers affected by one stroke. In the distribution lightning arrester circuits currents up to 10,000 amp. have been measured. Currents up to 50,000 amp. have been measured in broadcasting towers.

The majority of currents in all classes of installations have been of negative polarity. The larger currents, as a rule, are unidirectional, with the smaller currents tending to be oscillatory.

It has been possible in the case of some of the more complete installations to tell whether the stroke hit the

conductor, tower or ground wire, and thereby to evalulate the efficiency of the ground wire arrangement.

C. L. Fortescue urged that all available means continue to be used for lightning measurements until we are sure that the progressive scaling down of the maximum values found is not due to some inadequacy in the newer and simpler measurement methods.

High-Voltage Generation; Transformer Protection

Although the immediate interest lies in the foreign field, there was considerable discussion of the pros and cons of higher voltage generators at the machinery session. Laffoon and Calvert (Westinghouse) in their paper had cited two major problems: (1) The direct connection of such generators to lines and the judicious elimination of the intervening equipment and (2) the matter of internal design of the machines. Several methods, including complex grading shields for end turns, were advanced and it was stated that 33-kv. or 36-kv. alternators could be built without departing substantially from conventional design, but the question whether they are wanted depends on the economic aspects.

P. L. Alger (General Electric) sees no trend toward higher voltage generation and pointed out that hydrogen cooling greatly reduces the risk of corona damage. He questioned the efficacy of tapered shielding because there is an abrupt rise in gradient wherever the shield may terminate.

R. W. Wieseman (General Electric Company) likewise doubted the existence of any great call for higher voltage generation in this country despite the trend in that direction abroad. Up to the present time eleven 22,000-volt machines and one 24,000-volt machine, representing nearly 1,000,000 kva., have been built. These machines have given reliable service and the same type of insulation would be used on 33-kv. machines if they are required.

Little call likely here

The highest voltage machine in this country, 24,000 volts, built in 1929, is equipped with internal sheaths. Test demonstrated the effectiveness of the internal sheath by the fact that no discharge or corona occurred at the coils where they leave the slots. The only place where corona occurred was between the ends of the first and the last coils of the phase belt under test.

Generator kva. capacities increased in 30 years more than ten times, whereas generator voltages increased only 20 per cent. It is of interest to note that the high-voltage generators (none of which exceeded 35,000 kva.) were pioneered in Europe, where relatively large blocks of power are not distributed over long transmission lines.

In this country, except in metropolitan districts, any generator voltage which is now practical is entirely too low to transmit large blocks of power. With large generators, therefore, it is still necessary to use step-up transformers in distributing large amounts of power. The voltage of smaller machines which have a more limited area of distribution might be suited to economical transmission. In these cases, however, the generator is more difficult to build for a high voltage than a large machine. The inherent difficulty with the small high-voltage machine is in obtaining the necessary turns to generate the voltage and then in finding sufficient space properly to insulate the winding.

A 200,000-kva. high-speed generator has an economical voltage as low as 14,000 volts and a low-speed generator of this capacity could be wound for a fraction of this voltage. Thus, as far as the generator itself is concerned, high voltages are not essential. Switching and busbar difficulties, however, have increased the voltages of large generators above their economic values to 22,000 volts. The multiple winding generator has retarded somewhat the trend of increasing generator voltages and on this basis generator voltages may not exceed 22,000 volts until the multiple winding no longer limits the current per conductor to an economic value. A high-voltage machine with its lower efficiency and increased cost will have little economic justification unless the step-up transformers are eliminated.

In fact, H. M. Cushing's paper, "Design and Operation of Huntley Station No. 2," specifically states that a 12-kv. generator with an auto-transformer is preferable to a 22-kv. generator. With the present-day voltage limit of mica-insulated armatures set at about 36 kv. and the transmission of large blocks of power confined to 132 and 220 kv., it follows that rotating a.c. machines above 22 kv. will have a rather limited field of application.

Transformer Grounding

Interconnected primary and secondary neutral grounding was the main theme of the conference on distribution transformer protection. K. B. McEachron, who presided, said there was field evidence to indicate that the interconnection tends to increase flashover to the core unless the tank is grounded solidly or through a gap. F. J. Meyer of Oklahoma said he was sold on the grounding, but H. S. Phelps of Philadelphia joined him in desiring the full agreement of the field forces before proceeding with a program. D. C. Roper suggested that it was a relatively small percentage of transformers which would be saved by the measure. He mentioned the earlier use of a cutout in the ground lead so that linemen could isolate the tank from ground while working on the transformer, but this was an expensive way of controlling the situation.

With a gap inserted in the neutral interconnection several speakers favored grounding on the primary side of the gap. As for meters, there is a material reduction in burnouts when interconnection is employed. There is nothing about interconnection, however, which keeps lightning off the secondary when the arrester functions, but it does definitely reduce the power follow, and this was cited as the source of better meter experience. D. C. Roper of Chicago reported a slight increase in arrester failures since adopting interconnection.

Consensus seemed to be that grounding is solid in the metropolitan areas and through gaps in rural areas where customer grounds are few and more or less remote from the transformer. One company reported finding inconsistency in the breakdown values for arresters of the same model. If such variations are to prevail it is feared that switching surges at times may last long enough to break down arresters unnecessarily. On this point McEachron raised the question whether

the gradual reduction in breakdown value has been fully justified.

Alternative rectifier tests

Conference discussion of rectifiers brought out the conclusion that if a rectifier performs satisfactorily it is immaterial whether the anode insulation be tested under vacuum conditions or atmospheric pressure, and consequently there is no present move to specify either form of test. It was also brought out that cooling of large rectifiers involves auto-corrosion from the air and impurities in fresh water. Philadelphia Rapid Transit reports having only partial success with preventive paint and with the use of such inhibitors as sodium dichromate. O. K. Marti (Allis Chalmers) stated that the important thing is the elimination of air and the resort to recirculation cooling.

Insulating oils affect fifth of utility investment

With 2½ of the utility total investment of 12½ billions spent for equipment which relies upon insulating oil, it was asserted by Herman Halperin at a technical conference on this topic that there was ample justification for increased expenditures in this direction if only the sustained performance can be improved commensurately. The normal annual increment is more than $100,000,000, of which $25,000,000 represents underground cable, $60,000,000 transformer and $20,000,000 oil circuit breakers. For oil alone the expenditure runs to $3,000,000.

If oil could be fully relied upon for stability the depreciation of cable could be extended ten or fifteen years, with a resulting saving of 5 per cent in underground outlay. Dielectric losses could be averted to the extent of $1,000,000 annually if that loss did not increase with cable life due to instability of the oil. The savings to the industry would be even more significant if a single ideal oil could be found for all three major uses and not present the risk of flame or deterioration under arcing.

Adequate justification for vigorous co-operative research thus established, the oil chemists and cable research engineers present proceeded to delineate the paths which they felt further research should take. At the outset C. F. Hill of Westinghouse dispelled the idea that high refinement gave assurance of bettered electrical performance. On the contrary, it led to one oil that rose to 55 per cent power factor after sixteen days' heating on 60 cycles at 80 deg. C. The super-refinement had evidently removed the inhibitors to oxidation. It was his belief that degree of refinement deserved careful study. How far to go in the protection of oil against oxidation and how to control the residual ionization were the two large problems seen by J. B. Whitehead of Johns Hopkins, along with the choice between mass study of oils under field-service conditions and the research on small quantities of simplified constituents isolated by the oil chemist. L. Onsager of Yale characterized the problems as (1) finding out how the electrical properties are related to composition (a matter of physical chemistry) and (2) finding out what deterioration introduces into composition to change the electrical properties in service.

Oil chemists participate

Peroxide formation was classed by K. Hickman as a crucial phenomenon, because he had found that oils soaked into paper have to contend with the potent oxidation that comes from the peroxide emitted by the paper, and this was confirmed by E. W. Greenfield of Baltimore.

The third phase of the discussion had to do with the development of improved insulating oils, and the oil men participated actively after D. C. Roper of Commonwealth Edison Company set out the ideal objectives to be attained as the user sees them. E. H. Helman of Standard Oil of Indiana stated that the sulphuric acid method of refinement was to a considerable extent a solvent method and removes some of the more naphtheric components of the distillate complex. A. P. Anderson of Shell Oil said there was some indication that the aromatic components were better for solid cable and the naphtheric for hollow conductor. He favored solvent extraction of insulating oils because of its essentially physical character. As for utility research, he hoped that utilities and universities would determine the dielectric properties of all the motor and lubricating oils on the market, even though this might give no index of the specific process which would give the optimum electrical result. The objective of the refiner was said by Eugene Ayres of Gulf to be the segregation and removal of unstable hydrocarbons. But processes which on the surface are non-chemical, such as fuller's earth filtering and sulphuric acid, do cause polymerization.

One of Roper's requirements was a flat viscosity characteristic, although J. B. Tuttle (Standard Oil of N. J.) said that such oils had failed to satisfy. All refining methods in vogue tend to reduce the change in viscosity with temperature, however.

If cable manufacturers would permit the use of higher viscosity oils it would greatly simplify the problem of meeting their other requirements. W. F. Davidson of Brooklyn Edison

R. B. Bonney, Dr. A. R. Mann and E. B. Meyer

Mr. Bonney, senior vice-president, officiated in the absence of President J. Allen Johnson, Dr. Mann, provost of Cornell, extended welcome to delegates. Mr. Meyer is president-elect.

joined with A. L. Thomas of the United Company to assert that the ultimate test of insulating oil is the permanence of its electrical properties regardless of the incidental chemical changes which may occur in refining, use or renovating.

The chairman of the conference, K. S. Wyatt (Detroit Edison), cautioned against too ready a disposition to discard the constituents which have been eliminated in the effort to produce the far greater volume of lubricating oils. He also questioned the assertion of one cable manufacturer that there was no oil problem.

On the whole, the discussion left the choice between mass analysis of oils and highly sensitive tests on small samples of simple compounds with a synthetic objective about where it has been.

Oil breakdown and sphere gaps

An interesting session on selected subjects was held Thursday morning. P. M. Farmer described the several principles applied to protective signaling in fire, burglary, hold-ups and other applications of electrical protection. Use of thermal devices, radio waves, current interruptions, light rays and sensitive microphones were described. W. A. Del Mar wished to find some method for protecting the theft of books from libraries, but no practical solution of this problem is available.

The mechanics of conduction in good insulating oils were described by Dr. J. B. Whitehead. Continuous application of direct-current potentials apparently produce a tendency to reduce the conducting quality of oils, but this is a temporary condition only. It is apparent from the research that ions cause the several changes in conduction and that continuous application of potential produces electronic clusters or space charges near the electrodes due to ionic movements and combinations. While not of direct practical application, this research opened new fields for a fundamental knowledge of conduction in oils. The initial slowness of ionic migration and the final space charge effect is an interesting contrast to the behavior of gases under similar conditions.

Loss a conduction phenomenon

H. H. Race said that a former research on oils on the effect of temperature and pressure on oil conduction led to the same conclusion that the major cause of loss in oil was a conduction phenomenon.

R. W. Atkinson said that up to this time the improvement in the dielectric quality of oil had come about by the elimination of impurities, but that now it was necessary to go into ionic analyses of conduction in pure dielectrics. E. W. Greenfield suggested the study of space distribution of the charges as influenced between the electrodes by use of conducting vapors. Dr. Whitehead said it was now possible to purify oil to a degree that no impurities could be detected by chemical methods, but that such oil applied to paper cables was not under laboratory conditions and necessarily was impure. The study showed only that in pure oil conduction was an ionic phenomenon and not the result of impurities.

R. W. Sorenson described the use of sphere gaps to measure high voltage. The mechanical movement of a sphere near another charged sphere made possible quite accurate measurements of potential that were modified only slightly by the effects of surroundings.

J. R. Meador said the data agreed quite well with data taken by other methods, but that precise accuracy depended quite largely on the mechanical arrangement of the spheres. The advantage of the method in the elimination of the spark-over gap at the terminals of high-voltage apparatus and the disadvantages lie in the fact that the equipment is not portable and requires a knowledge of the wave shape of the applied voltage, since certain loads may distort 60-cycle waves.

Iron and steel application

The modernization of steel mills was reflected in a session devoted to new electrical apparatus for steel mills. One discussed the direct-current breaking of induction motors, with F. E. Harrell and W. R. Hough as authors. L. A. Umansky and T. M. Linville gave an interesting paper on the speed transients of d.c. rolling mill motors. R. H. Wright had a paper on electric power equipment for steel mills. William Deans discussed breakers and buses for steel mill service and L. A. Watson described the controls applied to a modern screw-down mill.

In the discussion stress was placed on bus and breaker arrangements for steel mill service. If single-pole breakers are used the buses may be spaced far apart, thus minimizing electromagnetic stresses, but simultaneous action of both breakers on currents up to 150,000 amp. is difficult, and Mr. Dean said it was necessary to use a compromise solution with a two-pole breaker as best in his judgment. Interesting discussion was had on details of the technical equipment used in modern steel mills and a notable feature was the increased use of automatic and master controls.

[Discussion on protective devices for transformers and on the Boulder Dam lines and breakers is reserved for a succeeding issue.—EDITORS].

Lamme Medal awarded to H. E. Warren

Nineteen years ago the synchronous electric clock was his hobby. Now the results of his developments may be seen in nearly every home and even in commerce and industry. Left to right—Prof. C. L. Dawes, Harvard, expositor of the medal recipient's work; R. B. Bonney, Denver, presenting award, and Mr. Warren, Ashland, Mass.

New Deal Proposed in Rural Electrification

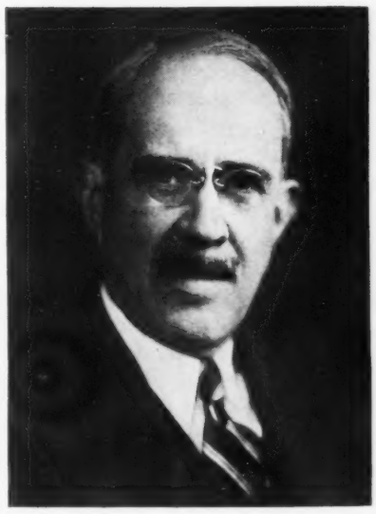
Rural Electrification Administration Plans Intensive Promotional Effort—With Low, Load-Building Rates and Liberal, Long-Term Customer Financing for Wiring and Equipment

An Interview with

MORRIS LLEWELLYN COOKE

Administrator
Rural Electrification Administration
Washington, D. C.

By LEONARD CHURCH



RESPONSE to the announcement of the creation of the R.E.A. has been encouraging. We have been deluged with letters from people in all walks of rural life begging us to make it possible for them to achieve their ambition of having electric service. We already have many applications under examination for the financing of rural electrification through co-operative groups, municipalities and private utilities.

In round numbers, 95 per cent of the electrical industry in this country is owned and operated by private interests and 5 per cent by the public. A realistic approach to R.E.A.'s problem, then, suggests that the facilities of the private industry be utilized to the utmost. And therefore accredited leaders of the industry have been advised that we will be at great pains to see that the private industry will be encouraged and helped in every way adequately to meet its responsibility in a great national undertaking.

Affording every possible help to the private industry in extending its lines still leaves the door wide open for making extensions through public agencies, such as states or subdivisions of the states and non-profit consumer organizations.

Every opportunity will be taken to offer aid to public and non-profit organizations. Any other policy would be as bad for the private industry as it would be for the public interest.

The private industry has virtually monopoly control over a preponderant part of the country. In selecting its areas of operation it has quite naturally chosen those where the financial inducements were the greatest. A quasi public industry so ensconced in the most profitable areas cannot be relieved from the responsibility for areas where margins of profit are more limited.

Lying between the rural areas which have already been electrified and those which obviously—at least from our present point of view—it is not economically feasible to reach without some form of federal or state subvention, there is an area where the question of financial returns responds to one's economic outlook. The question before the industry is largely as to whether the private industry will occupy it or let it lie as an inviting area for public enterprise.

Even in a rich urban community margins of profit vary as between individual customers. So it will necessarily be in rural areas. The value to the company of every connection and every mile of line cannot be assessed individually. The verdict must be on a certain penetration into rural areas viewed as one more class of service—always remembering that the farmer is a potential user in a sense that the average urban customer is not.

From both an operating and financial standpoint, the extent of rural electrification which is now being considered is necessarily relatively unimportant to the electrical industry. Certain companies could practically cover their rural areas and it still would not add materially to their capitalization. From an operating and financial standpoint rural electrification is the fringe of the private companies' problem. But I detect a growing realization on the part of the industry that it is the heart of its political and public relations problem.

Manufacturers co-operating

That section of the industry that comprises the makers of poles, wire, distribution equipment and electric appliances for the household and farm is eager to participate in our program, and its representatives crowd our offices. Industries active in lumbering, copper mining, metal fabricating, glass manufacturing and building of electric refrigerators, radios and other equipment, all stand to benefit in a large degree from this program. The lift that will come to them from an increased volume business will permit many more to operate in the black in 1935-36, and their increasing activity will be reflected in more men at work and more men off the relief rolls.

It is a matter of general knowledge that the rural business has held up better than most other parts of the electric utility business in the recent

depression. Now that we are emerging from hard times and the farmer's income is on the upgrade, no effort should be spared in making him a good customer. Mail order and chain store sales have been leaping ahead in rural areas—it is an opportune time for the utility industry to do some progressive selling.

We have one broad objective motivating our entire program. We propose to increase intensively and extensively the use of electricity in rural areas. To achieve this purpose we must have economical construction, low rates and facilities provided to enable the rural dweller to wire his premises and to buy electrical and plumbing equipment on very easy terms.

Efforts to increase use intensively will result in the connection of thousands of additional customers to existing lines and in increasing substantially the average annual consumption. Extending rural lines into areas now unserved and the building of many new lines will add many thousands of new customers.

Harvey C. Couch, president of the Arkansas Power & Light Company, in a recent address told the electric industry that there are a great many rural extensions that can be made right under its nose and that somehow these extensions have been overlooked. He is developing this overlooked business in his territory by building new lines.

We plan to promote increased use of electricity in rural areas by every legitimate means of education and demonstration. Intelligent promotion, backed by low rates and a liberal customer-financing plan for house-wiring and equipment, can raise the average rural consumption over 50 per cent.

Long before the Rural Electrification Administration was formally established, several of us had conferences extending over a period of months with a committee representing the electric utility industry, and we feel that the pooling of our experiences in these meetings was very helpful in threshing out a number of problems. Other conferences have been held with representatives of municipal plants and representatives of consumer and farmer co-operative groups interested in constructing rural lines.

We are in earnest about the need for what we consider to be real rural electrification. This does not mean just a drop light, however convenient that might be.

We frankly face the fact that an annual average consumption of 1,200 kw.-hr. or more is necessary if we are to anticipate widespread rural electrification.

With the industry's co-operation, this rural electrification program will make it possible to have *the* most remarkable sales increases in *rural* power in the history of the electrical industry.

Industry's opportunity

We are only asking the electric industry to do what it has done many times before when it used its imagination and, seeing the future value of industrial and suburban business, went after it hard—risking immediate loss for future gains that were soon realized.

Inertia must be overcome, misconceptions cleared away and prejudice buried. Skeptics say "rural electrification never pays . . . it costs $3,000 to build a mile of rural line . . . farms are too far apart to be economically served . . . the farmer can't purchase house wiring and high consumption appliances . . . we must charge at least 12 cents per kilowatt-hour for energy . . ." etc., etc., *ad nauseam*.

Let's look at the record and face facts without flinching. Many privately operated and municipally operated rural lines are highly profitable. Early this month an official of a large Southern company publicly stated that its rural business during the depression stood up better than any other class of service and in recent months showed the greatest pick-up.

Three thousand dollars is a fantastic figure for a rural line. Progressive utilities in recent years have been building them complete with transformers, service and meters to serve three customers for $1,000 per mile and under.

It may not pay to bring electricity to a farmer if you charge him with costs properly belonging to a failing stone quarry down the road, when it is the latter that required an unusually expensive type of line. It will pay when you build lines for the farmer tailored to his needs.

It is true the farmer can't afford Wall Street overheads—some doubt is being expressed as to whether the utility industry should stand them much longer. Rural electrification must pattern itself after a successful variety store, where things are sold on the basis of their usefulness, with low costs and a low profit margin. In the past it has been patterned after a jewelry store with expensive rents, luxurious, ornate fixtures, fancy prices and the high gross profit margin required to absorb heavy overheads.

It is admitted that in the recent past, with only short-term financing, high prices, high financing costs and 1932 farm prices, many farmers could not afford to purchase high-consumption appliances. This picture has changed. The Administration is planning financing extending over the reasonable life of the equipment, which will sharply reduce monthly payments. Equipment costs have dropped and average income per farm has increased over 40 per cent since 1932.

Rates

The subject of rates is very much in the picture. We have been asked whether we will lend money without indicating rates. Now we are well aware of the relationship which has long existed between the state and federal government with respect to rates, and we appreciate the fact that this relationship does not permit dictation by the federal government of intrastate rates. Some progressive companies have adopted such simple, reasonable rural rates that they present very little temptation to make rate changes. But some companies have rural rates so obviously out of line that we could not entertain the idea of making loans to them, but would extend aid to other agencies interested in serving the farmer in the same territory at reasonable rates. Between the two extremes we have many tenders from private companies for adjustments of rates in accordance with present-day ideas and in recognition of the helpful conditions the government is setting up.

A suggestion has even been made that where the distance from present levels to desired levels cannot be made at one jump without too great dislocation, the adjustments can be made in a series of steps spread over three to five years, which might be the way out of the dilemma for some companies which have to slash their overhead. So much for the rate situation with private companies.

When we lend money to co-operatives and municipalities—whose motive is service rather than profit, and whose credit standing in a particular instance may not be as high as that of a wealthy utility—we would naturally expect to have a good deal to say

about rates and pay-out possibilities. If rates are too high, consumption would be restricted, revenues would be pinched in a vise, and the borrower would be forced to default in the payment of the loan.

Unless rates and other conditions can be made attractive so as to induce high use—an indicated average of over 1,200 kw.-hr. yearly—credit will not be feasible in the absence of a subsidy which we are not prepared to grant.

We have no desire to be arbitrary, and we recognize that rates will vary in different parts of the country, but one of the great needs is a simple rate structure which can be understood by everybody and easily varied according to local conditions. Preferably the only change would be in the minimum charge.

In the past the electric industry has skimmed the cream and left the milk. Today it must take the milk with the cream, and the sweetening of lowered costs, cheap money, rising consumption and federal aid should make it more palatable.

We have a big task and it will be accomplished. We are counting on the electric utility industry to play a major rôle.

Cooke's Answers to Some Pertinent Questions

Q. What will be the basis for determining where rural lines will be built?

A. We will try and divide the fund equitably as between states and so as to have lines in different parts of the same state, while seeking real economic soundness and serving compact areas in their entirety, even though it involves taking some of the lean with the fat.

Q. Who will supervise erection of lines—contractors, farmers, utilities?

A. The erection of lines will be directed by contractors, utility companies, states and subdivisions of the states, farmers and possibly by the federal government itself.

Q. Will only relief labor be used in line construction, in house wiring in plumbing (inside and outside house and barns)?

A. The amount of relief labor used in line construction will depend very largely on the relief situation in each area and the types of workers available through the local offices of the United States Employment Service. The work connected with house wiring and plumbing will be conducted under private auspices, and the volume of work of this kind will be increased by a liberal policy in taking people off the relief rolls.

Q. What rate per hour will be paid the labor used on each kind of work?

A. To the extent that relief labor is used, the rate per hour in different sections has been prescribed by the President's Executive Order No. 7046, issued May 20, 1935, a copy of which can be obtained through the R.E.A., or through the Works Progress Administration.

Q. Will local committees (how large, and how paid) be set up to handle the projects—so far as soliciting farmers to join a line, sign contracts, etc.?

A. The R.E.A. has at present no plans for local, state or regional organizations. Local committees working up projects for submission to R.E.A. will be on a voluntary basis.

Q. Will the lines be turned over to utilities to operate and maintain, or will these functions be performed by some kind of state or local organization?

A. Many types of organization for maintenance and operation have been suggested for lines other than those built and operated by the utilities. Just how widely these optional plans will be used, or what their character will be, can best be realistically determined when we reach each individual project.

Q. How will the 100 millions be allocated among the states? Will the allocations to states or districts have to be balanced by proportionate local appropriations? Will there be grants made by the federal government?

A. The allocation of our funds as between the states will be directly related to the needs of the state as they are affected by the size of farms, percentage of tenantry, and other similar factors. There are no fixed quotas. We are not depending on local appropriations and we are not making any grants.

Q. Who will own the lines—independent organizations for operation or leasing to utilities—or will they become part of adjacent utility system, but without allowing capitalization or return on investment?

A. Where financing is afforded and security provided, title will in most instances ultimately rest with the borrower.

Q. How will utilities who energize lines, but do not own them, be protected from legal responsibility, if they do not specify construction and maintenance standards?

A. Co-operatives have very satisfactorily worked out their insurance problems, and this problem should be easy for them to solve.

Q. Will utilities sell wholesale to these lines, or at retail to their customers?

A. A co-operative will buy current wholesale where it is cheapest. The current will be measured either at the junction point or at the customers' meters. The price can be varied so as to provide for energy losses.

Q. Has any standard type of rural construction, other than lowest possible cost, been determined upon? Have minimum line construction specifications been completed? Will utilities who may operate or serve new rural lines have a voice in construction standards or specifications?

A. Many private companies are now revising their standards for rural lines in order to secure advantages offered by this program. R.E.A. will set up standards to be used on lines coming fully within its jurisdiction. Specifications, now being prepared, will be made available to anybody who wants them.

Q. Can any figures be given on miles of line and approximate cost by states or districts, preferably, or by groups of companies concerned?

A. It is too early even to approximate the expenditures to be made in any area.

Q. To what extent are private utilities commencing to build lines now?

A. It is quite obvious that building and preparation for building are already under way on a scale probably greater than in any previous period. One wire company advises us that April was the best month in its history on wires used on rural electrification work.

Q. Approximately how many miles of line will in all likelihood be built before July 1, 1936? Is the figure of 30,000 miles anywhere near correct?

A. The R.E.A. and its co-operating agencies are not making prophecies as to what is likely to be accomplished in the next year, 1½ years or 2 years, but we are laying plans to get the maximum of construction out of the funds at our disposal.

Q. Has a form of contract which farmers will have to sign been devised?

A. We are relying largely on local and private companies' initiative in such matters as form of contract with farmers. The tendency would be to allow the current practice as to form of contracts with farmers to be followed, except where favorable new conditions have made the terms of such contracts unduly burdensome.

Q. What type of electric rate schedule will be followed; flat, promotional, off-peak provisions or actual rates?

A. The matter of intrastate rates is one which rests with state authorities, but, in passing upon proposed loans, the federal government will naturally be influenced by the rates suggested for projects.

Sales Mount in Georgia

Georgia Power Adds 85 Kw.-Hr. to Average Domestic Use in 1934—Sales Staff Increased from 165 in 1933 to 326 in 1935—Cost of New Business 30 Cents per Dollar of Added Revenue—Details of Plan and Results

By L. W. W. MORROW
Editor

BACK in 1933 dark clouds hovered over the Georgia Power Company. Rate cuts, the depression, the T.V.A. yardstick, taxes and other troubles were disturbing to morale and to earnings. What to do was the question.

There was only one answer. The same answer was arrived at by all the Commonwealth & Southern properties in the South. This was to take advantage of low rates, publicity for electrification, the E.H.F.A. and all possible assets and go out and sell, go out and build load. The entire organization turned sales-minded. It put man-power and money back of sales. It put in new and different types of rates, added services to customers, established augmented dealer co-operative plans, introduced new financing and wiring allowance plans and greatly increased sales promotion expenditures—all tools were put to work.

What are the results to date? The accompanying chart showing the domestic business is indicative. The average domestic customer kilowatt-hour use was 803 in 1933; it was 940 for the twelve months ending in April, 1935. Merchandise sales per customer had dropped to $8 in 1933; now they are up to a $24 rate. Average revenue per domestic customer was $41.47 in 1933 and it was $35.53 in 1934—a decrease because of rate cuts. But it now has turned upward. If the sales program had not been undertaken, where would the company be?

But the dollars are not all that count. The entire organization is busy and optimistic. They see daylight. They are all sales-minded. The morale is splendid. There is hope where there was gloom and fear.

This company serves 163,729 customers in Georgia. Domestic customers number 126,758, commercial 36,007 and industrial and street lighting 923. It is a transmission system, with Atlanta as the largest city served. Hundreds of small towns, rural communities and farms are served in all parts of the state. It is a part of the interconnected group in Alabama, Georgia, South Carolina and Tennessee. It has always been active in sales and had established a reputation for competency and alertness before the depression and the T.V.A. arrived on the horizon. Thus the new program meant a change of attitude and an expression of methods well known and used previously. The job had to be done quickly and increased in scope and magnitude.

Here is the way the work started. A study of all existing markets was made by representatives of each division of the sales department. They brought in data, estimates and plans. These were discussed and consolidated in conferences. Each division finally had figures for sales, added revenue, costs, man-power and methods and plans to use in getting the business at a certain rate. Studies were made of actual and cumulative effects on a three-year and a five-year sales program.

Down in Georgia they believe it is good business to sell. The Georgia Power Company counteracted drastic rate cuts and the depression by embarking upon an aggressive merchandising and sales program. It takes advantage of low rates, T.V.A. publicity, the E.H.F.A. and better economic conditions to sell at a remarkable rate. Results to date on costs and returns are encouraging. An outstanding example of utility courage and competency.

For the domestic business three basic policies were adopted: (1) Intensify direct merchandising efforts of the company and the dealers; (2) intensify employee selling; (3) intensify efforts for more adequate wiring. Supplementing the direct selling effort, the home service department was enlarged to carry the story of the uses and advantages of electric service direct to the consumer, to educate the housewives in the use of new appliances and to keep them sold on appliances already in their homes.

A drive for industrial and commercial lighting was planned, as well as one for home lighting. Rural electrification, already embarked upon, was expanded greatly. Increased advertising appropriations were made for sales promotion. Power sales, industrial heating and air-conditioning markets were studied and plans were made to get the business. Above all, it was desired to get every employee and every dealer enthusiastic and interested in load building and sales.

This was the foundation work approved by the company executives. This was in March, 1933. Enlarged plans were made in June and another revision in the direction of expansion was made in the fall. Then came E.H.F.A. and T.V.A. with more financing, more co-operation and new appliance models. This led to a further revision and expansion in May, 1934. In September, 1934, the program was

further expanded. When the work started the plans were always found to be too conservative. The business was there and warranted acquisition in larger volume and at a more rapid rate than anticipated.

Drive for domestic and rural

The factors applied to develop the domestic and rural market are:

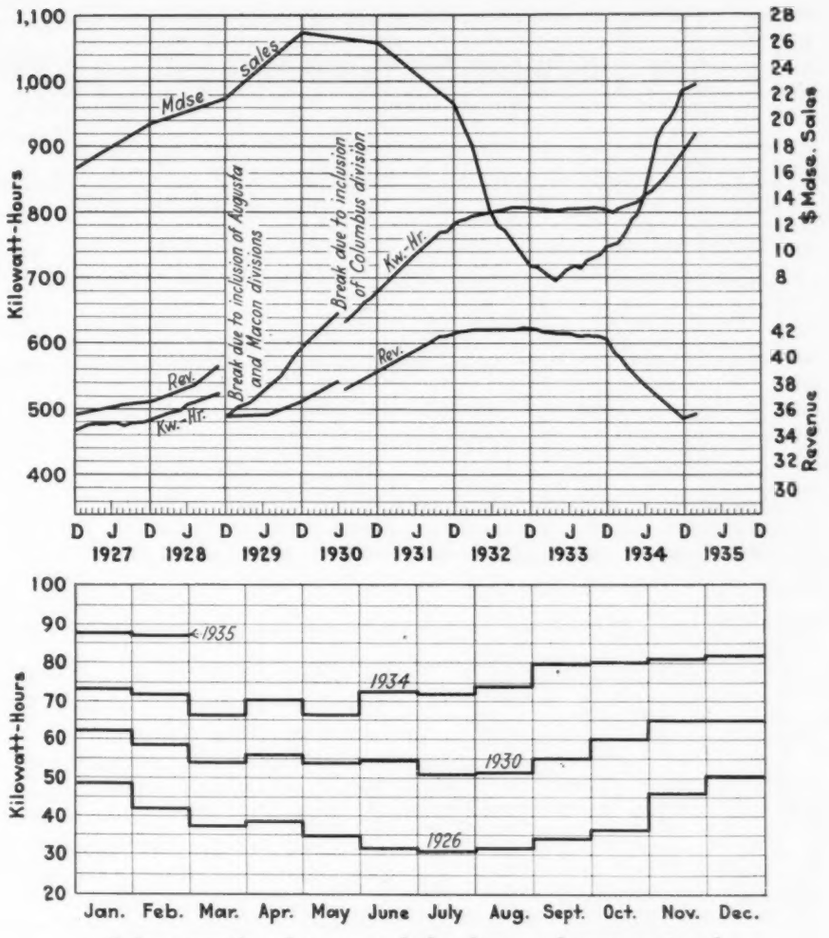
1. Rental as well as sales of ranges, water heaters and refrigerators.
2. Encouragement and full co-operation in dealer sales.
3. Encouragement of employee selling.
4. Promotion of adequate wiring.
5. Intensive promotion of lighting.
6. Return of unused appliances to service.
7. Acquisition of new rural and town customers.
8. Liberalizing of credit and collection policies.
9. Expansion of financing facilities.

In the commercial market the drive was for new and small town customers, intensive selling of window, store, sign and other lighting, recovery and enlargement of street lighting and the promotion and sales of electric cooking and refrigeration. In the power market efforts were concentrated on industrial heating and air conditioning.

Allowance of $80 for range additions and changes in locations were made to the system distribution capital account. On the customers' premises $37 was allowed for ranges, either new installations or moves, and $25 for water heaters.

As of February 1, 1935, the company had recouped about 75 per cent of the immediate loss in gross revenue and 50 per cent of the ultimate loss in free kilowatt-hours, caused by rate reductions.

Comparable revenues have been realized from commercial customers. The greatest expansion has occurred since June of last year, and an enlarged sales program for this year promises to bring a steady increase in present values. The company sold $2,448,462 of merchandise in 1934, as against $1,108,305 in 1933. The gross expense for the 1934 sales was $1,885,171 and the cost of new business per dollar of revenue was 29 cents. In February, 1934, after a large reduction in rates, the average price of domestic energy was 4.08 cents per kilowatt-hour. A year later the price had decreased to 3.64 cents, or 10.9 per cent. The average use per month in February, 1934, was 72 kw.-hr. and in February, 1935, was 87 kw.-hr., a gain of 20.8 per cent.


Kilowatt-Hours
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Break due to inclusion of Augusta and Macon divisions
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1927 1928 1929 1930 1931 1932 1933 1934 1935

Only energetic sales reversed the downward revenue trend

The gain in revenue per residential customer, comparing these two months, was 7.9 per cent.

Aid of home service girls

One of the valuable parts of the sales program is the home service division. This was enlarged from thirteen employees in 1933 to 55 in 1934. These girls visit homes to give service, to assist in getting appliances back into use, to give demonstrations, to open up sales prospects and to develop better lighting. As a tangible example of these workers the following report of the last six months of 1934 is interesting:

	Added Annual Kw.-Hr.	Added Annual Revenue
Restoring unused small appliances to use	71,675	$2,150
Restoring unused major appliances to use	314,550	6,291
Appliance sales to prospects developed out of calls	2,020,290	.....
Lecture demonstrations	282,125	.....
Home lighting calls	1,106,878	33,206
Home lighting lecture demonstrations	677,328	20,319
Total	4,472,846	$61,966

The total expense in getting this business was $59,389. These home economists and home-lighting specialists pay their way. But in addition they are invaluable assets from a good will and service point of view. They gain the friendship of customers and help them to understand and to use light and appliances. The services of the home service girls are offered free of charge to dealers for demonstrations of ranges and for cooking schools.

Another department of great value is the appliance repair or service department. This has been enlarged and reorganized to give service quickly and promptly. Experience to date shows that service expenses are about $3.50 a year per range, $3.20 a year per refrigerator and $1.60 a year per water heater. These costs are exclusive of the material furnished free by manufacturers and overhead expense.

Seventy of the cities and towns on the system have already built their average domestic use to 1,000 kw.-hr. a year or more and the total average for the entire system for the year ending in February, 1935, was 919.3 kw.-

Growth of Commercial Business

	1931	1932	1933	1934
Gross revenue	$6,104,161	$5,463,772	$5,113,651	$4,948,144
Kw.-hr. sold (millions)	150.49	132.82	128.36	139.05
Ave. No. meters	33,767	34,912	32,451	33,386
Average rate, cents	4.06	4.11	3.98	3.56
Kw.-hr. per meter	4,457	3,804	3,956	4,165
Distribution of Customers				
Per cent of total				
0-15 kw.-hr. per month	.....	26.0	.....	23.6
15-50 kw.-hr. per month	.....	28.2	.....	27.6
Over 50 kw.-hr. per month	.....	45.8	.....	48.8

Appliances Sold in Georgia Power Territory

	By Power Company		By Dealers	
Appliance	1934	1933	1934	1933
Refrigerators	10,428	3,619	10,572	4,661
Ranges	3,577	652	10	5
Water heaters	1,896	117	4	2
Washers	911	237	2,500	1,500
Ironers	314	40	200	150
Cleaners	518	453	3,000	2,000
Small appliances	50,263	22,875	18,000	15,060

Major Expenses in Sales

Division	1932	1933	1934	1935 (Budget)
Management	$33,835	$27,623	$26,986	$29,280
Home service	40,890	45,158	99,209	142,908
Advertising	129,641	138,038	173,521	197,568
Industrial and power	42,700	44,200	65,080	77,676
Commercial lighting	26,500	26,500	69,800	75,312
Rural	14,500	16,000	28,500	32,604

Shift in Domestic Customers

			Per Cent of Total, Kw.-Hr. Use per Month			
Year	Total Number Customers	Ave. Use per Mo.	0–20	20–40	40–70	70 and Above
1926	65,600	39.0	43	33	15	9
1932	107,103	63.8	28	29	18	25
1934	113,093	74.0	23	25	18	34

Merchandise Sales Grow Rapidly

		Number Sold		
Year	Dollar Volume	Refrigerators	Ranges	Water Heaters
1927	$1,298,385	1,296	1,449	261
1928	1,641,380	1,787	1,415	72
1929	2,349,913	3,453	2,352	449
1930	2,822,391	4,125	3,632	487
1931	2,138,404	3,417	2,813	841
1932	1,010,419	1,952	957	139
1933	1,112,999	3,619	652	117
1934	2,520,890	10,428	3,577	1,896
1935 (quota)	2,200,000	9,000	4,900	2,700

In 1934, 192 ranges and 22 water heaters were sold on rental plan. T.V.A. model units sold in 1934 were 4,356 refrigerators, 1,764 ranges and 1,089 water heaters. In 1935 company expects to rent about 5,000 lift-top refrigerators in addition to range and water heater rentals.

hr. per year, a gain of 14.2 per cent over the preceding twelve months.

Some idea of the magnitude of changes in sales of 1933 and 1934 is found in the fact that sales of refrigerators went from 3,619 units to 10,428, of ranges from 652 to 3,577, of water heaters from 117 to 1,896. Dealers sold an equal number of refrigerators in 1934 and are rapidly going into sales of ranges and water heaters.

Employee selling used

Employee selling has been very effective in getting low-use customer sales and in developing sales prospects. A large proportion of the employees are enthusiastic salesmen. They are paid to sell small appliances and to get prospects for major appliances. The effect of their work and of efforts to sell low-use customers is found in the decrease in the percentage of small-use customers. In 1926, 43 per cent of the customers used 20 kw.-hr. per month or less. In 1934 the percentage was reduced to 23.

Accompanying tables show the costs and returns, the major expenses and the expansion in man-power. It took plenty of money to do the job, but it paid. The cost of new business was low per unit and this shows how volume brings cost reduction. Executives of the company are well pleased with results to date and are going to enlarge the program rather than curtail it.

During this year it is planned to:

1. Extend the range and water heater sales and rental program.
2. Finance appliance sales through cooperation in F.H.A. loans.
3. Introduce an enlarged dealer cooperative plan to sell ranges and water heaters.
4. Intensify sales of air-conditioning equipment for domestic and commercial uses.
5. Revise wiring allowance policies. Introduce the use of small 1-, 3- and 5-gal. water heaters with installation allowances up to $15.
6. Enlarge and intensify retail sales plans.
7. Put on a sales and rental drive for lift-top refrigerators to low-use customers. Payment at an average of $1.75 per month for first year and an average of $1.25 per month for the next four years.
8. Introduce a competition for towns. Build up civic competition in kilowatt-hour average use per customer. Give prizes and have the mayor and council designate the charitable institution to which prizes will go.
9. Enlarge the home service division.
10. Introduce a plan for promoting the installation of more convenience outlets.
11. Aid 38 towns served on wholesale contracts to build up sales and use for their 24,000 customers. Company salesmen will be offered to dealers on an equitable arrangement.
12. An enlarged and intensified rural program.
13. Special sales promotion and campaigns in undeveloped territory.
14. A drive will be made on apartment house electrical installations.
15. A detailed equipment and economic survey will be made of all markets in order to help the sales program.

They are not quitting in Georgia. They have learned from experience that every plan laid out so far was inadequate and had to be enlarged. They are going ahead at full speed and are enthusiastic about selling their way out of present difficulties.

Costs and Returns in Sales

Year	Total Expenses	Revenue from New Business Added	Expenses per Dollar of Added Revenue
1932	$672,637	$899,927	$0.75
1933	495,041	1,166,467	0.42
1934	546,767	1,835,730	0.30
1935 (budget)	801,698	2,200,000	0.36

Expenses include merchandising profit or loss. Losses occurred in 1932 and in 1933, but a profit of $145,188 was had in 1934.

Man-Power in Sales

	No. Employees			
Division	1932	1933	1934 (Budget)	1935
Management	8	7	6	6
Home service	12	13	55	60
Industrial	2	1	1	1
Power sales	11	13	19	19
Commercial lighting	9	9	31	31
Rural	4	5	11	11
Merchandise	143	117	174	198
Total	189	165	297	326

Thyratron Motor Applied

Electronic Control Adopted for 400-Hp. Induced-Draft Fan Drive in Generating Station Affords Superior Advantages

By PHILIP SPORN . . . G. G. LANGDON
American Gas & Electric Company, New York

Electronic devices are finding their place in carrier relaying, carrier communication, voltage regulation and excitation. See articles by the same authors in ELECTRICAL WORLD *for February 2 and 16, May 11 and June 22, 1935. Here they put them to work at motor control with confidence in superiority over other variable-speed controls. A final article on an electronic battery charger will close the series which pioneers the invasion of the power field by the tubes which refused to be content with tasks in radio and telephony.*

THE present status of heavy current electronic applications on our system can be summarized briefly as follows:

1. A considerable amount of actual progress has already been made in applying electronic devices to solving power system problems, and a number of devices, among them being the battery charger and the thyratron motor (the latter discussed in this article), offer a great deal of promise for the future.

2. The cost of the thyratron motor is at present higher than that of other variable speed drives, but there is nothing fundamental in this; it will change as tube costs come down, as they surely will, when demands for motors of this type and for other heavy electronic equipment develop. The thyratron motor now offers a simple variable speed a.-c. drive. It ought to become an inexpensive one also as soon as thyratron technique has been perfected and quantity production is realized.

3. Eventually each of these electronic devices will find a place for itself as a commercial electrical device or the basis of, first, its economic advantages and, second, the operating experience obtained with it; or it will disappear and be relegated to the ranks of laboratory curiosities.

4. While definite progress has been made, there remains a large amount of work to be done before the full possibilities offered by heavy current electronic devices are realized in practice. These possibilities will not be adequately realized until power system engineers thoroughly familiarize themselves with the characteristics of these devices, study their advantages and disadvantages and obtain actual operating experience with them.

5. Although weak current vacuum tube devices have reached a stage of development where performance can generally be predicted with reasonable accuracy, new applications involving gaseous tubes have not yet reached this stage, and further operating experience at the present time is not only absolutely essential for indicating the performance and likely economics of the specific devices developed, but for judging the trend which the development of heavy current carrying tubes in general should take, and for determining what other advantageous applications of tubes might be opened up by such developments.

In spite of the many known methods for obtaining speed variation on a.c. motor drive, there has been no really satisfactory variable-speed motor equal in ease of control and reliability to the d.c. shunt motor, for example. The power industry has suffered from that not only because of its retarding effect on the application of electric drive in many cases but also more directly—in the steam generating station, for example. Thus, for boiler fan drive there have been tried single constant-speed motors with damper or vane control on the fan end, one slip-ring motor with armature control, two slip-ring motors each with armature control (each motor covering a portion of the speed range), hydraulic variable ratio couplings, Rossman drive, straight d.c. drive and various other drives. All of these methods have been proved to possess one or more serious disadvantages.

Constant speed a.c. motors with damper control result in comparatively poor efficiency, high maintenance and require frequent renewal of fan blades. Vane control has improved the efficiency and reduced fan blade wear, but involves more moving parts requiring maintenance and is

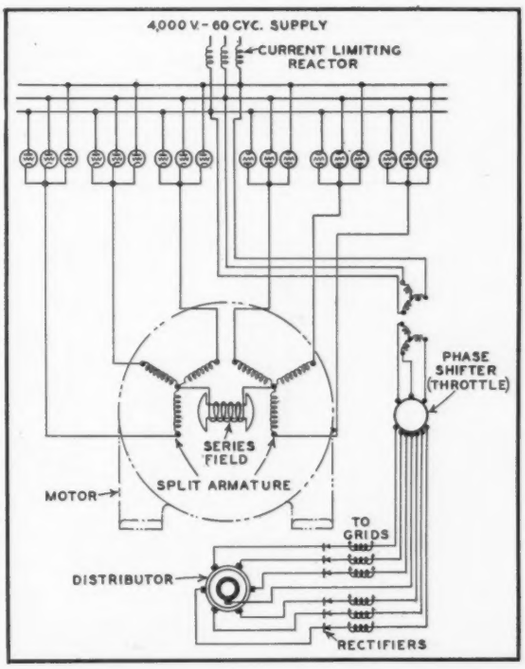
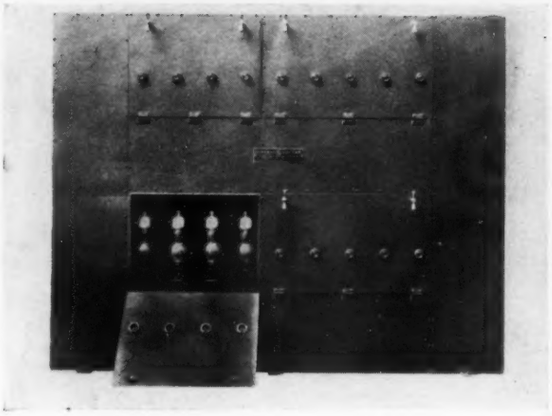


Fig. 1—Elementary circuit of thyratron motor

Although the development of the motor and the thyratron technique employed has been described in detail elsewhere,* the general scheme is noted briefly below. The thyratrons are used in the unique circuit shown to connect and disconnect, in proper sequence, two three-phase armature windings (and the series field winding) to each phase of the power supply. The portion of the 60-cycle wave used, and consequently the effective armature voltage and field current, is controlled in the thyratron grid circuits by means of a small phase-shifting selsyn motor located on the control panel. The arrangement provides, in effect, a d.-c. series motor utilizing thyratrons to perform simultaneously the functions of rectifier, commutator and speed controller.

**Electrical Engineering,* November, 1934, page 1517.



The steel-inclosed control unit shown (right) houses the eighteen type FG-118 thyratrons and their associated control apparatus. The tubes are air-cooled by a thermostatically controlled forced ventilating system and are protected against failure of heater supply by a three-phase, time-delay relay which opens the primary circuit breaker. The design illustrated will be modified as shown in Fig. 3 before installation, in order to permit tube replacements to be made without shutting down the motor.

Fig. 2—Thyratron control unit

higher in first cost. Two-speed motors reduce the duty on adjustable vanes or dampers and improve the efficiency, but frequently require special switching equipment involving considerable maintenance, particularly when it becomes necessary constantly to switch from one speed to the other. Variable-speed, wound-rotor motors using resistance control provide for fan speed control in smaller steps, but are inefficient and require excessive maintenance of the rotors in the high-temperature, dust-laden atmosphere of the boiler room. The commutator motor provides speed control over a wide range, but is uneconomical for draft fan service. The Rossman drive also provides flexible speed control, but is expensive and requires a considerable amount of mechanical maintenance due to its involved construction.

There has recently been developed a hydraulic coupling which offers possibilities of an economical solution of the speed variation problem in power plant practice. This, however, has a number of objections, such as lag of response. While some of these objections may be overcome, it has appeared to the authors, at any rate, that the most logical solution of this problem would be an all-electrical solution, and the development of the thyratron for the first time opened up new possibilities in this respect. Use of the thyratron makes possible a motor that is simple and has substantially all the ruggedness of the induction motor. This is made possible by the fact that to the thyratron is given the job of commutation and speed control.

All these considerations, coupled with the further fact that we are convinced of the necessity of intensely following electronic applications, led to a decision to order a 400-hp., 2,300-volt, three-phase, 60-cycle thyratron motor for induced-draft fan service at one of our power plants. This motor has been built and tested, but has not as yet been placed in service; it is, therefore, too early to give any operating experience.

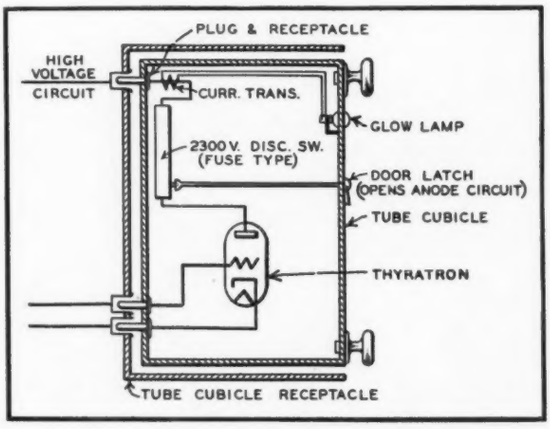
Looks like ordinary induction motor

The motor itself has the external appearance of a standard induction motor. It utilizes a split stator or armature winding, "Y"-connected, between the neutrals of which the field is connected. Fundamentally, therefore, it is simple and rugged: in appearance the only apparently novel feature is a distributor mounted on the shaft for controlling the firing of the thyratrons. From this standpoint it would seem that the only problem here is to keep the distributor properly closed so as to keep out dirt and dust, with the possibility of improper operation from this cause. Two sets of distributor segments are required at present, one set for starting and one set for running; it is hoped that further developments will enable one set to be dispensed with, thus simplifying control.

Details of connection of the motor windings of the distributor of the selsyn control are all shown in Fig. 1 and are further amplified in the explanatory text accompanying it. It is to be noted that eighteen tubes are employed. The physical arrangement of these tubes is shown in Fig. 2. This constitutes the heart of the thyratron motor, so to speak, and is the form in which the equipment will be installed in the field, except for some minor changes.

These improvements will consist of the sealing of the distributor compartment of the motor, sealing of the thyratron control unit against the accumulation of coal dust and, in particular, a provision for replacing tubes, to be carried out without shutting down the motor. This provision is analogous in an ordinary machine to being able to change a commutator bar, slip-ring or brush without shutting down the motor, and is perhaps more than would be called for ordinarily. It is felt, however, that the limited experience with tube life and the fact that eighteen tubes are employed on the job make this feature highly desirable if too frequent disturbance to service is not to be experienced during the period that tube performance may be undergoing improvement. The arrangement to bring this about is indicated schematically in Fig. 3; this will alter slightly the appearance of the thyratron control unit from that shown in Fig. 2.

The type FG-118 thyratrons em-



On unlatching the door the disconnecting fuse, normally held in place by an eccentric cam, is released, which interrupts the high-voltage thyratron plate connection. The entire cubicle can then be safely replaced, without shutdown, using a spare unit which is kept continuously on filament preheat. A master key arrangement (not shown) permits normal inspection of all cubicles or testing of tubes after the motor has been shut down, without releasing any of the disconnecting fuses. The glow lamp shown provides a better visual indication of proper tube functioning than is obtainable by inspection of the tubes through a peephole.

Fig. 3—Removable thyratron tube cubicle permits tube replacement without shutting down

ployed are of the positive grid type and have a nominal rating of 10,000 volts, 12.5 amp. average and 75 amp. peak. It is of interest that the voltage rating is considerably higher than that of previous tubes employed and that the nominal average current rating can be somewhat exceeded due to the soft circuit employed (*i.e.*, one in which the maximum current in the tube is limited by the circuit to a few times normal).

Motor has smooth control

Some of the salient features and characteristics of the motor are as follows:

(a) Relatively high efficiency over the entire speed range. This is shown definitely in Fig. 4, the data being test data. In Fig. 5 this is compared with the corresponding characteristics of a commutator type motor and of a standard armature resistance control method of obtaining variable speed. The striking difference in efficiency between that and the thyratron motor is particularly noticeable.

(b) Speed control is smooth and accurate from standstill to maximum speed.

(c) Has smooth speed-torque characteristic similar to that of a d.-c. series motor.

(d) Adaptable to a simple remote or automatic control arrangement.

(e) Can be started from standstill with speed control set at maximum.

(f) While two slip-rings and a collector-ring are used, the duty on these is light.

(g) Motor is equipped with an overspeed device and time-delay protective relays to prevent damage to equipment in case of either a loss of load or other than a momentary power supply failure.

Operation of the motor on test—and it was put through very stiff paces—was very satisfactory. For example, the motor was started with various combinations of tubes out of service, and was even started on single-phase power supply connected to a load equivalent to the fan load which it is to drive. The motor performed satisfactorily under all of these methods of operation. Undoubtedly the motor will seldom, if ever, be called upon to meet some of these contingencies in actual practice. These data are presented in more complete form in the following summary of tests, which were made at the factory on an equivalent fan load:

1. A series of readings were taken at speeds ranging from 350 to 625 r.p.m., shown graphically in Fig. 4.

2. With the motor fully loaded (400 hp., 625 r.p.m.), suddenly dropping the load caused no damage to the tubes and the motor was tripped at 720 r.p.m. by the overspeed device.

3. Opening and immediately closing the primary breaker at various loads and speeds caused no noticeable ill effects.

4. Starting current at full load (from standstill) was 190 amp., or only two times the rated full load current of 95 amp.

5. Operating at undervoltage (1,800 volts) under various conditions of speed and load, no unusual performance noted. Under the full load condition the speed dropped to 83 per cent at 78 per cent rated voltage.

6. Motor started and operated satisfactorily single phase (auxiliary supply remaining three phase to supply heaters of tubes). Speed dropped from normal to 446 r.p.m. on basis of fan loads.

7. Various combinations of from one to four tubes were removed from their sockets. The only noticeable effect was a decrease in speed.

8. Interrupting the cathode heater supply caused the automatic timer to trip the primary breakers after a predetermined fifteen-second timing period. Speed and load remained normal for the fifteen-second interval.

9. Interrupting all control power for twelve seconds dropped the speed to 400 r.p.m., the primary power remaining three phase.

Fig. 4—Performance characteristics of thyratron motor as determined by test

The relatively high over-all efficiency over the entire range is to be noted. While the power factor is low at fractional loads, it is to be noted that it improves with the increase in load and is excellent (86½ per cent) at full load.

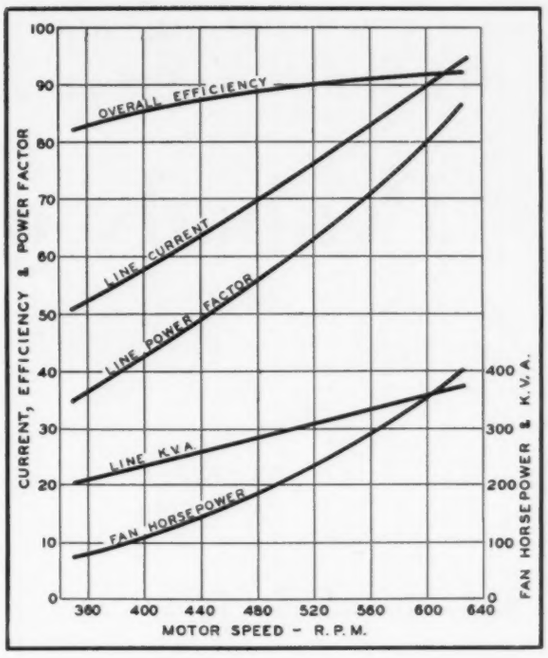
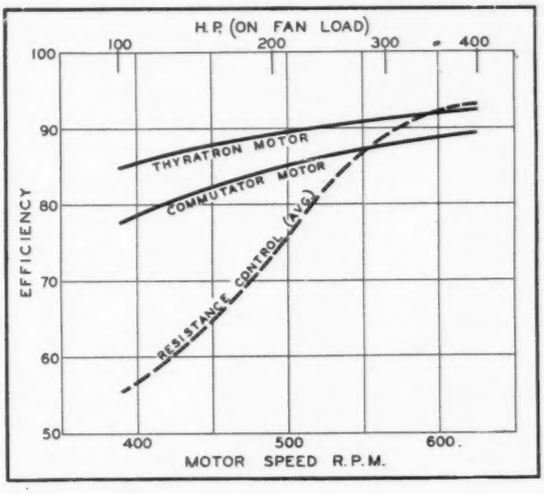


Fig. 5—Comparative efficiency of thyratron variable-speed motor

Although the thyratron motor provides excellent speed control from zero to full speed, its efficiency is higher than other commonly used variable speed motors; illustrated are type BTS (commutator type) and MT (slip-ring, armature resistance control) variable-speed motors of equal rating.



From all the above it is evident that the only unknown quantity in connection with the whole job is the question of tube performance, and particularly tube life, but this problem is the general tube problem and is not a specific problem applying to the thyratron motor alone.

Undoubtedly the tubes available today leave a great deal to be desired, both from the standpoint of life and uniformity, but in fairness to the tube designer it must be stated that no real progress can be expected until tubes by the hundreds and thousands are put to work in the field and their life histories, including their diseases and complexes, intelligently recorded. This, it must be apparent, is a prerequisite to an intelligent diagnosis and eventual cure. It is here, in the finding of proper tube applications, that the utility engineer can do his share in bringing to a realization the promise of advancing the art of generation, distribution and utilization of electric energy that a full development of the heavy power tubes holds forth.

One of a Series of Intimate Talks with Industry Executives

Peabody on Stewardship

An Interview by

H. S. KNOWLTON

IN THE central Connecticut Valley between Springfield and Turners Falls, Mass., a substantial proportion of the electricity consumed by the public is furnished by subsidiaries of a "neighborhood type" of holding company. The enterprise illustrates the advantages of centralized management with strong local directing interests, co-ordinated engineering and operating practice. Designed to realize the benefits of holding company organization without sacrificing the best features of individual utility administration, the Western Massachusetts Companies has won a high place in public regard during the past seven years. To summarize the reasons for this success, I recently asked W. Rodman Peabody, vice-president of the holding company, to state the basic philosophy of management in this group of properties.

"This holding company," said Mr. Peabody, "is just a useful and economic legal device for making electricity available at reasonable prices in the home of the average man of this region. But the local business men on the local boards of each company wanted to secure the benefits of regional co-operation without sacrificing home town good will. Therefore local control with local membership on company boards of management was continued, and in no other organization with which I am familiar has more important service been rendered to the consumer.

"About twenty years ago twenty independent electric lighting companies in this part of the Connecticut Valley generated their own electricity and performed their own small jobs as well as they could. By 1927 these companies had gradually been united into about ten systems, all independent, but all in some way dependent on the hydro-electric power at Turners Falls for regular or reserve supply. Then a buying wave struck the utility industry. A substantial block of stock of the Pittsfield Electric Company had already been acquired by a foreign company. A proposal had already been made to buy the United Electric Light Company of Springfield. The stock of the Turners Falls company was being snapped up. If this had continued local supervision would have ended and control through local directors would have vanished.

Danger in division

"Had foreign interests acquired the ten companies, it would have made the Turners Falls supply difficult. The owners of the Turners Falls company, having no association with the other companies, might well have taken advantage of a critical moment to raise the price of the electricity which they were selling. Or, the local companies might have decided to drop Turners Falls power unless the rate were cut. From the stockholders' viewpoint the situation was dangerous and there was little time in which to act. So a holding association was quickly formed, with exchange of stocks to facilitate managing all the companies in a common interest.

"Consolidation into one operating property was impossible under state laws. The companies were not in every case contiguous. The stocks were of different par and market values. The state utilities commission considers it easier to regulate a small, independent company and believes that the larger the unit the more difficult the setting of the rates may be. It is hard, for example, to make a common rate for the city of Springfield and the Berkshire country."

"How were these obstacles overcome?" Mr. Peabody was asked. "Well, strong local direction was made basic in this organization," he said. "A majority of the directors of the Springfield company are Springfield men, and so on. While the affiliated companies are managed as a group, including engineering, commercial development, public relations, accounting, etc., each keeps its individual identity with local control, local management and, above all, local responsibility to the community served. Insurance costs have been cut from $66,000 to $35,000, with better coverage; centralized machine billing has been adopted and billing practice made more efficient. Improved control of water flowage has been achieved through membership in the Connecticut Valley Power Exchange, and much coal has been saved.

"Rates have been reduced by $7,800,000 since 1927. We were able to meet the Governor's request for an April 1 rate reduction because over a series of years we have been able to make up a rate reduction program. All we had to do was to move back our August reduction to April. In these past seven years we have also increased dividends by $2,800,000 and invested $10,000,000 in new plant, besides carrying our overhead cost, the cost of borrowing money, etc., at the same gross income we had in 1927. In a word, we have been able to pay the cost of the additional money necessary to keep the plants up to date; to give 60 per cent of the remaining savings back to the public in lower rates, and have shared 32 per cent of the savings with our stockholders. And this," said Mr. Peabody, "seems to me to be fair dealing with the public."

W. RODMAN PEABODY, vice-president and legal guide of the Western Massachusetts Companies, has been identified constructively with public utility development in the Bay State for many years. He is an exponent of good citizenship on the part of power companies.

ELECTRICAL WORLD

L. W. W. MORROW • EDITOR

PUBLISHED EVERY OTHER SATURDAY BY McGRAW-HILL PUBLISHING COMPANY, INC.

VOLUME 105 ESTABLISHED 1874 NUMBER 14

JULY 6, 1935

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Our Rosy Dream Is Here

THE "New American Home" is on the way. In the General Electric Company's competition 2,040 architects submitted designs, and from these plans somewhere between 2,000 and 5,000 demonstration homes are expected to be built about the country. Purdue will build this year from ten to twenty model houses near the campus, as a result of its recent National Homes Conference. Manufacturers are offering a refreshing variety of new materials and many sampling projects are under way. Meanwhile, the F.H.A. Better Homes Program is making good progress and the long-prone curve of home building is rising abruptly.

The movement is of absorbing interest because out of it is coming not only a new cottage architecture and a new technique in home building but also new ideas and new ideals in home life. For these new houses are organized around practical methods for labor-saving, convenience and comfort. All the advantages of modern electric refrigeration, cooking, water heating, dish washing, laundry, cleaning, air conditioning and lighting are being combined in a fireproof, insulated structure, in which a family may enjoy a degree of economy, security and leisure that has not been known before in the small dwelling. The influence of this evolution promises far-reaching, social significance in America.

To the electrical industry it is a pearly dream come true. For instead of struggling to introduce our separate appliances one by one into the old-time home, as we have for the past 25 years, we find these new houses designed to utilize a complete electric service, as the basis of a modern domestic plant for modern living. It is our dream entire, but recast from the viewpoint of the modern family. And so great is the appeal that demonstration homes should be located strategically throughout every utility system at the earliest possible moment. One house will build more load than many extra salesmen.

Return to Sanity

BY AN unexpectedly decisive vote the House said no to the Presidential demand that that body agree with the Senate to obliterate holding companies. Instead of the predicted margin of 40 there were 70, then 110 and finally 242 who thought first of right and reason and much less of duress. The fight for preservation of the public good there is in system integration is by no means over, but the first open skirmish routed the Administration in no uncertain terms. To the great credit of the utilities the lobbying was wholly on the side of the unofficial emissaries of the White House. A surging roar of disapproval from the people back home in the districts drove the Congressmen to consider their constituencies and their own political fortunes in preference to enactment of an imperious obsession.

What will happen now if the House stands by regulation and the Senate by annihilation no one can tell. It would not be surprising to see a few lords of the Senate turn equally sensible and independent by rescinding their previous one-man margin in favor of obeisance. If they do not it is to be hoped the bill will die a deserved death. If they do reverse it will mean that the electric utility investor will have taken a place second only to the Supreme Court in interposing the popular will to check the flood of capricious legislation, of which the original Wheeler-Rayburn bill was the very worst and even the passed House bill unnecessarily punitive.

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Engineering—Service or Profession?

SHALL engineers follow the doctors and develop a highly exclusive professional status through laws, limitations and professional rulings? Or is engineering so different in scope and function that there is every reason to believe it would be a mistake to emulate the medical and even the legal professions? This is an active situation for engineers to discuss. Licensing laws have been passed in most of the states, the accrediting of engineering colleges is under way, definitions for engineers are in preparation, new specifications are proposed for membership in the professional societies. A definite movement is under way to raise the engineering profession to a legal and social status that has its being in a restrictive attitude and a technical definition of engineering.

Engineering differs from law and medicine. It is not personal service to an individual client. It has more of the service function in it. It devotes itself to use of the materials and forces of nature for the good of humanity. It embraces technical specialization at one extreme, and finance, operation and organization

of industrial enterprises at the other. A narrow activity that is based upon personal specialization and personal technical work is not sufficiently inclusive. Broadly speaking, an engineer is a business man in some cases and a technical specialist in others. His function and his activities vary as widely as the circumstances under which all activities of modern life are conducted.

Any attempt to straitjacket engineering as a profession based upon specialization and strictly technical activities is a mistake, in our opinion. Due regard, of course, should be given to educational preparation, to experience and to character in admission to the profession, but the gradual evolution and growth of engineering in this country has developed a record and a status for engineers that in nowise deserves to be thrown overboard by extremists who do not fully understand the functional and service aspects of engineering as contrasted to those of law and medicine. A fair and complete discussion of this new movement should be had by engineering groups. Guidance and perspective are needed.

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Pick-and-Shovel Days

WHEN the Supreme Court declared that NRA was too fast for this day and age the Administration said something about reversion to horse-and-buggy days, as if that were wholly deplorable. Consistency would call for adherence to modern methods in administering the $4,000,000,000 relief fund. But no, that has now suddenly shifted to a pick-and-shovel basis. Man-hours of direct and immediate labor must absorb as many as possible of the 3,500,000 idle voters. One envisions a modern pyramid-building slave army of 10,000 men with wheelbarrows toting sand to lay the levees for a $10,000,000 Quoddy tidal power project. Likewise, new bridges would become pontooned scows built out of hand-hewn timber. Such primitives are, as an exaggerated interpretation of the new relief orders, little above the level of the earlier leaf-raking and boondoggling that made good comic scrip copy for a while.

Utter confusion seems to reign in connection with relief. In the furious haste to get persuasive results all the lasting public works projects are thrown overboard because they place too much reliance on the remote contributory labor under direction of private contractors. The vacillation is in itself condemnation of this route to recovery. There is nothing of recovery in it. There is nothing in it that can even be recovered. It is time to placard this colossal fund with its true name—a patronage club to make sober-minded senators and representatives vote for such "must" measures as the Wheeler-Rayburn bill, T.V.A. expansion, etc., which are in themselves only other obstacles to a normal, orderly recovery, already too long retarded.

Progressive Modernization of Electric Drives Pays

IT IS often said that American industry is now electrified to the tune of far more than half its productive capacity in machinery, and the conclusion is frequently drawn that very little more remains to be done in the way of motorization along other than purely routine lines. Nothing could be further from the truth, as recent applications of electric power in the confectionery-making field testify, to take but a single example of the benefits of modernization. In a typical plant which lately took up quarters in a section of a mill group now occupied by about a dozen industries in place of the former one-industry establishment, the move into the new home represented a consolidation of several smaller properties previously dependent on a heterogeneous assortment of motor drives.

In the modernized plant 180 induction motors were installed, ranging from ¼ to 40 hp. in rating, every motor being equipped with across-the-line starting switch and push-button control. Multi-drives were applied to numerous special machines, getting rid of an amazing amount of complication in the way of belts and shafting around the productive equipment. Conditions were made safer and cooler for employees; maintenance costs were reduced substantially by modern motor applications, and, most important of all for this industry, provision was made for securing variable-speed operation in cases where variations in the grade of material in process require such facilities in order to keep the production line properly supplied. These speed changes were in general made available to the machine operator without the necessity of calling in the plant mechanical staff to make changes in gears, etc., and as a result the cost of production has been cut to about one-third what it was per pound of confectionery in the less modern plants.

As many other industries will find, and indeed have learned from experience, modernization of motor drives can be made to pay even if begun on a small scale. The above confectionery manufacturer did not commit himself to modernization at the first suggestion, but the results were so favorable from the initial outlay for individual motors equipped for variable-speed service that the improvement of the entire plant followed as a matter of course. Spare motors purchased against future emergencies steadily found their way into regular service, and research into new applications of power and electric heating in this industry opened new avenues of profit to the manufacturer and the electrical interests serving him. So valuable is ability to fit production speeds to particular material that a differential of 25 per cent or more in price for motors specially equipped for multi-speed operation down to extremely low revolutions per minute at the main machine shaft was gladly paid.

City Plant Barred; New Rates Deferred

Board of Estimate rejects La Guardia's $45,000,000 project — Referendum to be held — Action deferred on Consolidated rate schedule

Mayor La Guardia's proposal to borrow $45,000,000 from the federal government to construct a municipal yardstick power plant in New York City was rejected last week by the Board of Estimate. It was the second time the Mayor has failed to obtain the required number of votes for approval of this project. In spite of his defeat the Mayor announced that he would shortly submit to the Municipal Assembly, which is composed of the Board of Estimate and the Board of Aldermen, a local law calling for a referendum on the project at the next general election. The referendum would have been necessary even if the vote on the loan application had been favorable.

No action on the new rate schedules submitted by the electric companies of the Consolidated Gas System will be taken by the Public Service Commission until after July 8, Chairman Milo R. Maltbie announced following the closing of the hearings on the proposed new rates. The final hearings were devoted to testimony on behalf of the Hotel Association of New York City and five realty corporations which objected to certain proposed rates in the commercial classification for breakdown and auxiliary service. These groups were given until July 8 to file briefs with the commission.

Stockholders approve merger

Stockholders of the New York Edison Company and of the United Electric Light & Power Company at special meetings held June 28 approved the proposed consolidation of the two companies, subject to the approval of the New York Public Service Commission. The application to combine the companies now is pending before the commission.

Sharp criticism of Governor Lehman's utility program passed by the Legislature last year and of the Public Service Commission featured the hearings of the Mack committee investigating public utilities. The attack was led by George R. Fearon, Republican leader in the state Senate, but other witnesses admitted that in several instances attempts by the commission to reduce rates had been characterized by mistakes, and costly hearings were held with no benefit to the consumers.

"It seems to me," Senator Fearon said, "that the commission might cease invoking rules of law which have been definitely settled against them by the highest courts in the land and cease an effort based on hope and prayer that perhaps by reason of the times the courts may change their rulings, and accept what the courts have laid down as law. If they would accept that and go into some of these things that you have been developing here, where it might appear that some companies are improperly carrying in the rate base obsolete, abandoned property, there would be more hope of a reduction in rates to the consumer than there is with all this sparring on legal questions. . . ."

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Utilities Pay One-Sixth of Property Taxes in Oregon

Public utilities pay more than one-sixth of property taxes in Oregon, Berkeley Snow, executive-secretary of the Northwest Electric Light and Power Association, told 100 public utility representatives attending the association's tenth annual meeting of the accounting and business practice section. In seven counties of the state utilities pay one-fourth or more of the property tax levied. The total of 1933-34 public utilities property taxes was $7,346,626.

Importance of the accounting department as a guide for utility operations was stressed by Franklin T. Griffith, president Portland General Electric Company, in the opening address. "Executives have an increasing appreciation of the work of the accountant," Mr. Griffith stated.

An active discussion on how customers may be better served in their business contacts with the company featured the afternoon session. W. F. Miller of the Washington Water Power Company, Spokane, led the discussion.

Other speakers on the program included L. T. Merwin, vice-president and general manager of the Northwestern Electric Company; L. R. Coffin, president of the association and vice-president, Puget Sound Power & Light Company; Herbert W. McIntosh of Price, Waterhouse & Company; F. W. Test, Portland General Electric Company, and J. D. McPherson of the California-Oregon Power Company.

T.V.A. Amended Bill Reported to House

Military affairs committee warns Congress to keep within constitutional limits — Many powers modified — New measure assailed by Morgan

Amendments to the Tennessee Valley Authority Act, diminishing some of the powers which the Administration requested for the Tennessee Valley Authority, have been voted by the House military affairs committee and reported to the House. The compromise bill was recommended with an admonition that "Congress should be exceedingly and scrupulously careful to keep within constitutional limits." Sidetracked for several weeks in the committee room by a 13 to 12 division against the original draft, the bill was redrawn to curtail many of the powers of the Senate bill.

The provisions of the compromise bill reported to the house by the military affairs committee were essentially the same as those contained in the bill introduced by a special subcommittee and referred to the full committee (ELECTRICAL WORLD, June 22, page 44). The provision, however, giving the Federal Power Commission authority to pass on plans of private companies for construction of dams and other projects on the Tennessee River and tributaries was eliminated.

Prompt action expected

Arthur E. Morgan, T.V.A. director, described the bill as amended in the House military affairs committee and now awaiting action as "worse than nothing." The committee changes give the appearance of a deliberate atempt to kill the T.V.A., he said, but added that when the bill came to the floor efforts would be made to put it in more acceptable form. The modified proposal will probably be brought up in the House next week.

The remarkable increase in annual use of electricity in the home and in sales of household electrical appliances in Georgia is in no way attributed to the activities of the Tennessee Valley Authority, Preston S. Arkwright, president of the Georgia Power Company, maintained in a recent statement. In fact, the possible forced sale of transmission and distribution facilities of private utilities to the federal agency, as threatened by T.V.A., has done more to retard development than to make for expansion, Mr. Arkwright pointed out.

Holding Company Death Sentence Defeated by House 323 to 81

In a record vote chamber rejects Administration's demands 258 to 147, then passes own bill — Three tests made — Inquiry ordered into lobbying activities — Conference next aim

Unequivocally rejecting President Roosevelt's demand for a death sentence on public utility holding companies, the House of Representatives on July 2 by a vote of 323 to 81 passed its own bill, providing for the regulation of utilities. Preceding this action, the House had voted 258 to 147 to substitute its own bill for the drastic Senate measure which carried the death penalty. This was the first record vote, the vote the preceding day on the acceptance of the Senate measure being checked by teller only. It stood 216 to 146 against acceptance.

The bill now goes back to the Senate for concurrence or rejection. If the compromise committee which will be appointed cannot adjust the differences in the Senate and House bills, it is likely that the subject will lie over without any action.

Differences in bills

The House bill leaves up to the Securities and Exchange Commission how many utility holding companies may exist in the future, whereas the Senate approved measure fixed 1942 as the deadline of all unnecessary holding companies and provided there might be none more than once removed from operating companies. The Senate bill also bans service and similar contracts between holding companies and subsidiaries, the House measure leaving that largely up to the commission. Both regulate the interstate movement of electric power.

Bitter debate prevailed before each of the three votes was taken.

Representative Connery of Massachusetts said the power trust "is almost telling the country what it may eat for breakfast." Representative May of Kentucky countered by saying that the Tennessee Valley Authority is the greatest utility holding company in the world. Representative Blanton of Texas stated that the public never will get electric service at reasonable cost until holding companies are done away with.

At a crucial point in the debate Representative Connery delivered to the House the message of William Green, saying that the American Federation of Labor is standing with the President on this issue. Representative Cooper of Ohio pointed out that Mr. Green could not be speaking for the thousands of workers in the utility field facing the loss of their jobs. Representative Robsion of Kentucky charged that the Senate bill "puts the holding companies out of business without a hearing, while the House bill gives them their rights to prove their innocence even if the President picks the jury." Representative Fish of New York said he had received more than 2,000 protests against the death sentence from the President's own congressional district. He said that those who are opposed to state socialism will vote against the death sentence.

Before the final vote on the adoption of its own bill, the House was told by Representative Connery that it was voting between the United States government and the power trust. He concluded: "I hope to God the government wins."

Following the vote Senator Wheeler said: "If we can't get a decent bill out of conference I am in favor of letting it die and going to the country on the issue. This is my personal view. However, I think we can work out a satisfactory bill in conference."

Lobbying activities to be probed

Representative Brewster of Maine charged Thomas G. Corcoran of the legal staff of the Reconstruction Finance Corporation with having used a threat in an effort to force him to vote in favor of the death sentence clause. He said that Mr. Corcoran had threatened to have work stopped on the Passamaquoddy power project unless Mr. Brewster voted with the Administration. The charge was made on the floor of the House, which at once ordered its rules committee to investigate lobbying activities of both friends of the Administration and utility foes of the measure.

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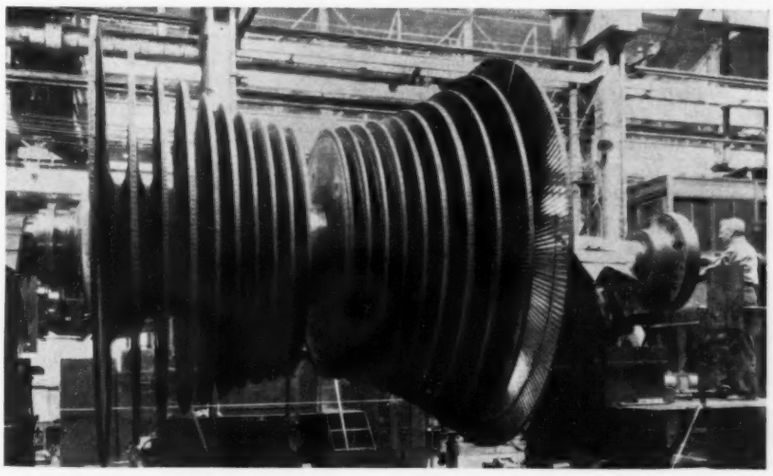
Accident Rates Increase

Figures just released by the National Safety Council reveal that accident rates in the public utilities industries increased during 1934. The 1934 frequency rate is 13 per cent higher than that of 1933, while the increase in severity is 8 per cent. These changes in rates may be compared with increases of 5 per cent in frequency and severity averaged by industry as a whole. The 1934 utilities rates are based upon reports from 612 public utility companies, whose employees worked 651,273,000 man-hours. The frequency rate is based on the number of disabling injuries per million man-hours of work, while the injury severity rate is determined by the number of days lost through injury per one thousand hours of exposure. The compilation includes telephone and telegraph, natural gas and manufactured gas, public utilities as well as electric utilities.

LOW-PRESSURE ROTOR BEING BALANCED



The ten-stage double-flow (20-wheel) rotor of the low-pressure half of the 110,000-kw. steam turbo-generator set being built at Schenectady by the General Electric Company for the Ford Motor Company is shown in the accompanying illustration. The new turbo-generator, similar to the one placed in service in the River Rouge station in 1930, but operating at higher temperature, will be a vertical compound unit and will use steam at 1,200 lb. pressure and 900 deg.

Secretary Ickes Attacks Duke Power Company

Officials of the Duke Power Company have taken exception to certain statements made by Secretary of the Interior Harold L. Ickes in his book just published entitled "Back to Work." Mr. Ickes stated that George G. Allen, president of both the Duke Endowment Trust and the Duke Power Company, was playing a "Jekyll-Hydeian" rôle in opposing a $2,767,000 P.W.A. loan and grant to Greenwood County, South Carolina, for a power-generating plant.

"On the surface," he said, "it appeared that only the finer humanitarianism of the Dukeites was pained by the prospect of lower rates to the people. Nothing was said about the business of the Duke Power Company in Greenwood County; it was the benevolent Duke endowment that would suffer irreparable damage unless consumers paid more for electricity than it was worth."

The official statement issued by the Duke Power Company said in part: "To us it is a strange spectacle indeed to find our company singled out for a special object of attack by a governmental official for the reason that a considerable portion of its dividends go to orphanages, hospitals and other charitable institutions in North and South Carolina. It would not be proper to reply to so much of Mr. Ickes' statement as refers to the Greenwood County case, as this case is still pending in the courts. But certain of his statements can be answered without impropriety. He says, or at least by insinuation tries to say, that the rates of the Duke Power system are too high. . . . The report of the Federal Trade Commission is a matter of government record which does not substantiate Mr. Ickes' statement as to the Duke rates. As to the pending suit in the federal court, it is sufficient to say that the power company is merely undertaking to avail itself of the orderly processes of the law to protect what it conceives to be its legal rights. . . . We prefer not to enter into any discussion with Mr. Ickes as to the work of the Endowment, as the record of this work speaks for itself."

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Tidal Project Opened

Construction work on the Passamaquoddy Bay power project near Eastport, Maine, started on July 1 and formal opening exercises were held on July 4. Orders were issued by Major Philip B. Fleming, Army engineer and construction chief of the project, for the clearing of an 80-acre tract west of the city for a little community of 250 homes to house 400 workers. Present plans, he said, called for the construction of six dams, two power houses, twelve to fifteen smaller dams, and levees to impound water in a reservoir, gate locks and a headrace canal.

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Nebraska Power Projects Get Additional Allotments

Nebraska's new public power project has received a $3,600,000 increase in P.W.A. allotments. The Loup River Public power district has been given additional funds in the amount of $1,400,000 and the Platte Valley power and irrigation district gets $2,200,000, bringing the total allocated to the two projects to $18,400,000. The new funds will permit both projects to increase their potential power output and to extend transmission lines beyond original plans.

The additional funds will permit extending the 110,000-volt transmission line of the Platte Valley project to be built between North Platte and Grand Island so as to connect with the Loup facilities at Columbus. They will also permit the Loup project to run a 110,000-volt line from Lincoln to Omaha to give the project a double power entry to Omaha. Separate 110,000-volt lines running from Columbus to Lincoln, Omaha and Sioux City, Iowa, were provided for under the original allotment.

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Laclede Officers Defend Deals in Receiver Suit

While directors of the Laclede Gas Light Company were authorizing the payment of $5,510,500 in common stock dividends between September 1, 1927, and September 30, 1933, no provision was being made for the retirement of $3,000,000 in gold bonds which were to mature April 1, 1934, or for gold notes due August 1, 1935, E. L. White, secretary and treasurer of the company, testified recently at a hearing in a suit brought for a receiver, an accounting and cancellation of contracts between Laclede and other subsidiaries of the Utilities Power & Light Corporation.

Attorney for J. Lionberger Davis, who is suing, also developed that the company in 1926 netted $580,000 from its electrical business, but in leasing its electrical properties to Laclede Power & Light Company entered into a contract with the latter company for the payment of only $394,000 annually. In defending the contract figures, Mr. White said the price was based on the Public Service Commission's valuation of the property leased, the return to Laclede being 7½ per cent. He also referred to the contract as advantageous to Laclede Gas and said its terms required the power company to maintain the property, pay taxes on it and provide for depreciation. Explaining failure of the company to provide for retirement of maturing securities, Mr. White said directors anticipated being able to take care of the retirement by issue of new bonds.

At a previous hearing, E. P. Gosling, president of Laclede Gas Light, defended the company's policy of dealing extensively with its affiliate companies in the purchase of materials and for services and advice, rather than with unrelated companies on an open market.

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Edison Foundation Charter Filed in New York

The Thomas Alva Edison Foundation has been incorporated for the purpose of creating a living tribute to the inventor whose genius gave to the entire world the first practical incandescent lamp and the phonograph. The charter, filed under the membership corporation laws of the State of New York, provides a wide range of activity in which education is to play an important part. It has "for its particular objects the advancement and diffusion of knowledge in the fields of physics, chemistry and the engineering arts and sciences, both basic and applied."

Conceived by the Edison Pioneers, a body of co-workers with the inventor, and the American Institute of Electrical Engineers, and with the approval of the Edison family, the Thomas Alva Edison Foundation is to carry out plans to perpetuate recognition of the world's progress emanating from the inventor's efforts.

Incorporators of the foundation are: William S. Barstow, president of the Edison Pioneers; H. H. Barnes, Jr., L. W. W. Morrow, editor of the ELECTRICAL WORLD, and Charles F. Scott, professor of electrical engineering at Yale, representing the American Institute of Electrical Engineers, and W. S. Mallory and F. A. Scheffler, representing the Edison Pioneers.

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Federal Tax Extended

House Joint Resolution No. 324, extending the 3 per cent federal electricity tax for two years, has been passed by the House of Representatives by a vote of 247 to 217. This was accomplished by changing "1935" in the original act to "1937." Unless extended the tax would have expired June 30.

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Canadian Output Increases

Central electric stations in Canada produced 1,923,071,000 kw.-hr. during May, against 1,830,820,000 in May, 1934. Exports to the United States declined to 94,256,000 kw.-hr., compared with 97,475,000 in April.

Economy Purchase Plan Launched in Alabama

More liberal terms on the sale of electrical appliances, rivaling those offered by the Electric Home and Farm Authority, have been put into effect by the Commercial Credit Company in Alabama in co-operation with the Alabama Power Company and the leading appliance manufacturers. An "economy purchase plan" is featured, similar to one which has been successfully tried out by utilities in Buffalo, N. Y., and Jackson, Mich., and which it is proposed to extend to to other Southern states in the heart of the Tennessee Valley territory.

Under the plan, major appliances may be bought over a 36-month period, the same time allowed by the E.H.F.A. Payments on a range or water heater run $2.50 per month and on a refrigerator $3 per month. Two of the appliances, for example a range and a refrigerator, may be purchased over a four-year period, which compares with the five-year period offered by the E.H.F.A. Such a plan, the manufacturers and utilities hope, will make appliances available to families in the lower income brackets.

Any dealer may take advantage of the low financing provided the utility in his territory and the manufacturer whose product he handles are co-operating. The dealer agrees to furnish credit information on the purchaser, make necessary service calls and take back any appliance which the finance company has to repossess. Those paying their bills promptly are allowed a net amount, those ten days late are charged a gross amount and those twenty days late have to pay a $1 reinstatement charge. If the bill runs 30 days late the appliance is repossessed. Bills are sent out from the nearest utility office and are payable at the same place.

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Michigan Association Holds Annual Meeting

Members of the public utility industry gathered in Grand Rapids June 20-22 to attend the annual meeting of the Michigan Electric Light Association. At the sessions many excellent addresses were made on a wide variety of subjects. Robert R. Brown, delivering the president's address, said: "On the whole, the electric light and power industry in Michigan, despite depression setbacks and despite uncertainties arising from hostile schemings and machinations, is all set to go ahead. Its onward course toward broader and better and cheaper electric power service for the people of the state would appear to be brighter and more secure than for the past five years were it not for political storm-clouds on the horizon."

F. A. Newton, rate expert Commonwealth & Southern Corporation, New York, spoke before the joint session of the Michigan Gas Association and the Michigan Electric Light Association. "Safety in Construction and Operation of Distribution Lines" was the title of a paper read by Fred W. Bagnall, Detroit Edison Company; "Development in Overhead Lines" was contributed by K. R. Jackson, Consumers Power Company, and "Accident Prevention in Public Utilities" by C. L. Bougher, Michigan Electric Power Company. H. R. Stevenson, Detroit Edison Company, made an address on "Big Little Load Builders." Rural electrification was covered in an address by Frank M. Mason, Detroit Edison Company.

New officers elected at the closing session are: President, B. S. Eppes, Consumers Power Company; first vice-president, C. L. Bougher, Michigan Electric Power Company; second vice-president, R. McPhail, Citizens Light & Power Company, Adrian; secretary-treasurer, Herbert Silvester, Detroit Edison Company.

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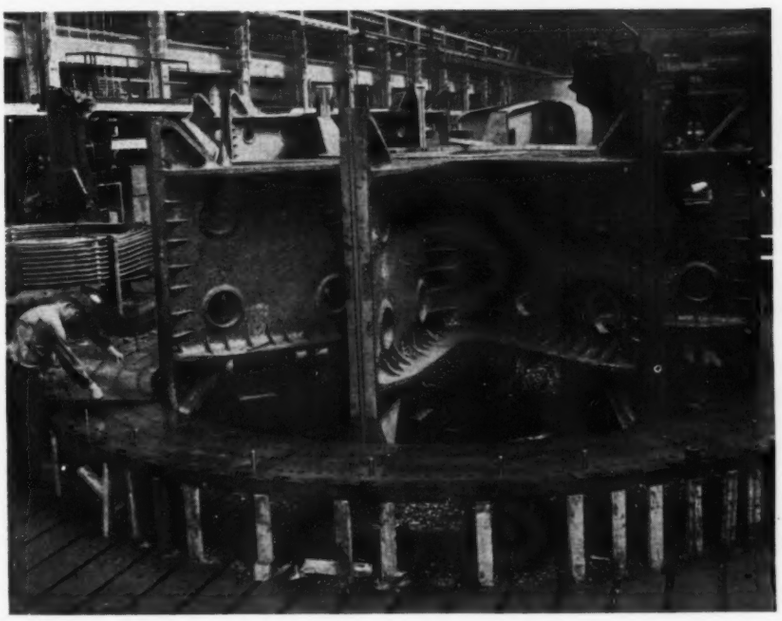
Grand Coulee Plans Revised

Plans for the Grand Coulee dam have been extensively altered in an order signed June 7 by Secretary of the Interior Ickes. The order calls for construction up to a height of 177 ft. of a complete foundation for the 500-ft. dam ultimately contemplated. The original plans called for construction at this site of a 297-ft. power dam and a permanent cofferdam, both of which eventually would be incorporated into the larger structure. The new plans abandon immediate power development and call for a dam which can be fitted more economically into the long-range development of the Columbia River basin. This calls for construction of a high dam to create a reservoir 150 miles long to store 5,200,000 acre-feet of water for use in irrigating about 1,200,000 acres of arid lands below the dam site and installation of power generators with a capacity of 1,890,000 kw.-hr. per year. Construction of the high dam has not yet been authorized.

When the Grand Coulee contract was let it was planned to construct a low dam for hydro-electric power production pending the time when the Columbia basin project should be developed completely. Since then authorization of other power dams in the Pacific Northwest have reduced the need for an immediate power development at Grand Coulee. Another consideration in making the change was that engineering problems connected with binding the proposed high dam to the low dam would be much more serious than those connected with binding to the flat foundation surface now planned. The low dam at Grand Coulee would have cost $63,000,000, together with installation of generating equipment. Revised plans will call for a somewhat lower expenditure.

STACKING 600,000 POUNDS OF LAMINATIONS



These lamination segments being stacked on the spider of one of the Boulder Dam generators are the largest to be made at the East Pittsburgh works of the Westinghouse Electric & Manufacturing Company. Each segment is 65 in. long, 34 in. wide and ½ in. thick, weighing about 50 lb. A total of 600,000 lb. of laminations are required. The generator will have a rating of 82,500 kva.

More Standardization Urged at British Convention

Steps to insure the expansion of the British electrical industry were outlined by E. E. Hoadley, well-known electrical engineer, when he delivered the presidential address at Britain's first National Electrical Convention, just held at Bournemouth.

"There are problems," declared President Hoadley, "which should be solved within the industry without the pressure either of Parliament or public opinion. They are standardization of voltage, standardization of methods of charge and standardization of apparatus, especially domestic apparatus. What reasons can be advanced to excuse there being no fewer than fourteen public supply voltages in use in Britain between 200-250 volts?

"Standard methods of charging should be possible, and they are highly necessary at least to domestic consumers. Now that nearly all undertakings pay for their current on a two-part tariff, agreement should be sought as quickly as possible on a standardized two-part tariff for domestic users. We are letting pure science take the place of ordinary common sense. We want to do a job so thoroughly that there is no loophole for any mistake, and yet in trying to attain this very perfection we are apt to lose the fundamentals of what is required.

"Another problem which should be tackled is the cheapening of distribution. Much is being done to cheapen the generation of electrical energy, but this only concerns the wholesale side of it. Equally energetic efforts should be made to cheapen what I might term the retail side of the business—the conveying of the energy from the grid points and other places to the consumers' terminals."

The convention was attended by approximately 3,000 delegates from all parts of the country and they discussed a wide range of subjects. The principal papers delivered covered electrical production and adaptation of electricity to domestic purposes. A committee was formed to promote co-operation between the various sections of the industry.

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Seattle to Install Diablo Generating Equipment

Within a few weeks installation of the generating equipment for the Seattle Diablo powerhouse will begin, according to J. D. Ross, city light superintendent. The equipment, purchased five years ago before the depression temporarily stopped the Skagit development, has been put in storage at Diablo, where extraordinary trouble has been taken by city light officials to prevent deterioration or damage. Equipment includes two 95,000-hp. generators, together with waterwheels and other equipment. It is estimated that about one year's time will be required in installing the equipment.

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Winnipeg Merger Plans Near Completion

Arrangements have been practically completed for submitting to the security holders and others concerned, the general plan of consolidation and readjustment of Winnipeg Electric Railway, Manitoba Power Company, Ltd., Northwestern Power Company, Ltd., the Winnipeg, Selkirk & Lake Winnipeg Railway Company and the Suburban Rapid Transit Company, dated May 15, 1935, as approved by the protective committees representing the bondholders of the three major companies, and by the directors of each company. Recently the requisite orders of the Court of King's Bench, Manitoba, were made, directing meetings of the various classes of bond holders, and others interested to be called. Payment of interest on the first mortgage 5½ per cent bonds, series A and B of Manitoba Power Company, Ltd., due July 18, will be withheld pending submission of the plan of consolidation to the vote of the bondholders.

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Illinois Tax Bill Passes

Final action was taken last week by the Illinois Senate on the bill to raise additional relief funds by a 3 per cent sales tax on private and municipal utilities. The Senate concurred in House amendments to the utility tax, one of which exempted sales of industrial power. The bill, a companion to the increased retail sales tax, now goes to the Governor for signature. Its constitutionality has been questioned as a result of the amendment exempting power sales.

COMING MEETINGS

American Institute of Electrical Engineers — Pacific Coast convention, Seattle, Wash., August 27-30. Great Lakes District meeting, Purdue University, West Lafayette, Ind., October 24-25, H. H. Henline, national secretary, 33 West 39th Street, New York.

Illuminating Engineering Society—Annual meeting, Hotel Netherland Plaza, Cincinnati, Ohio, September 3-6. D. W. Atwater, general secretary, 29 West 39th Street, New York.

National Electrical and Radio Exposition — Grand Central Palace, New York, N. Y., September 18-28.

Electrochemical Society—Fall meeting, Washington, D. C., October 10-12. Colin G. Fink, secretary, Columbia University, New York.

Municipal Utilities Association of New York State—Annual convention, Watkins Glen, N. Y., July 11-12.

Consolidated Gas Changes Result from Retirement Plan

Changes resulting from the new plan for retirement of executives who have reached or passed the age of 70 and of the proposed unification of Consolidated Gas affiliates (June 8, page 80) have been announced. Shifts in the executive personnel, now being planned, will require about a month or two to complete. Changes decided on are: George B. McLaughlin, president of the Brooklyn Trust Company and a trustee of the Consolidated Gas Company of New York, elected a director and a member of the executive committee of the New York Edison Company; Frank W. Smith, president of the Consolidated Gas Company, elected to the boards of the Astoria Light, Heat & Power Company and the New Amsterdam Gas Company and to the executive committees of the latter company and the Westchester Lighting Company.

Other changes include: Robert B. Grove, executive vice-president of the New York Edison Company, made a director of the Westchester Lighting Company; Oscar Fogg, executive vice-president of the Consolidated Gas Company, to join the board of the New York Steam Corporation and the executive committees of the United Electric Light & Power Company and the Brooklyn Edison Company; R. H. Tapscott, vice-president of the New York Edison Company, elected a director of United Electric Light & Power Company; Walter Holcomb, vice-president of Brooklyn Edison Company, chosen a director of that company. M. T. Sellman, assistant secretary of Consolidated Gas Company, made assistant vice-president in charge of sales and customers' service.

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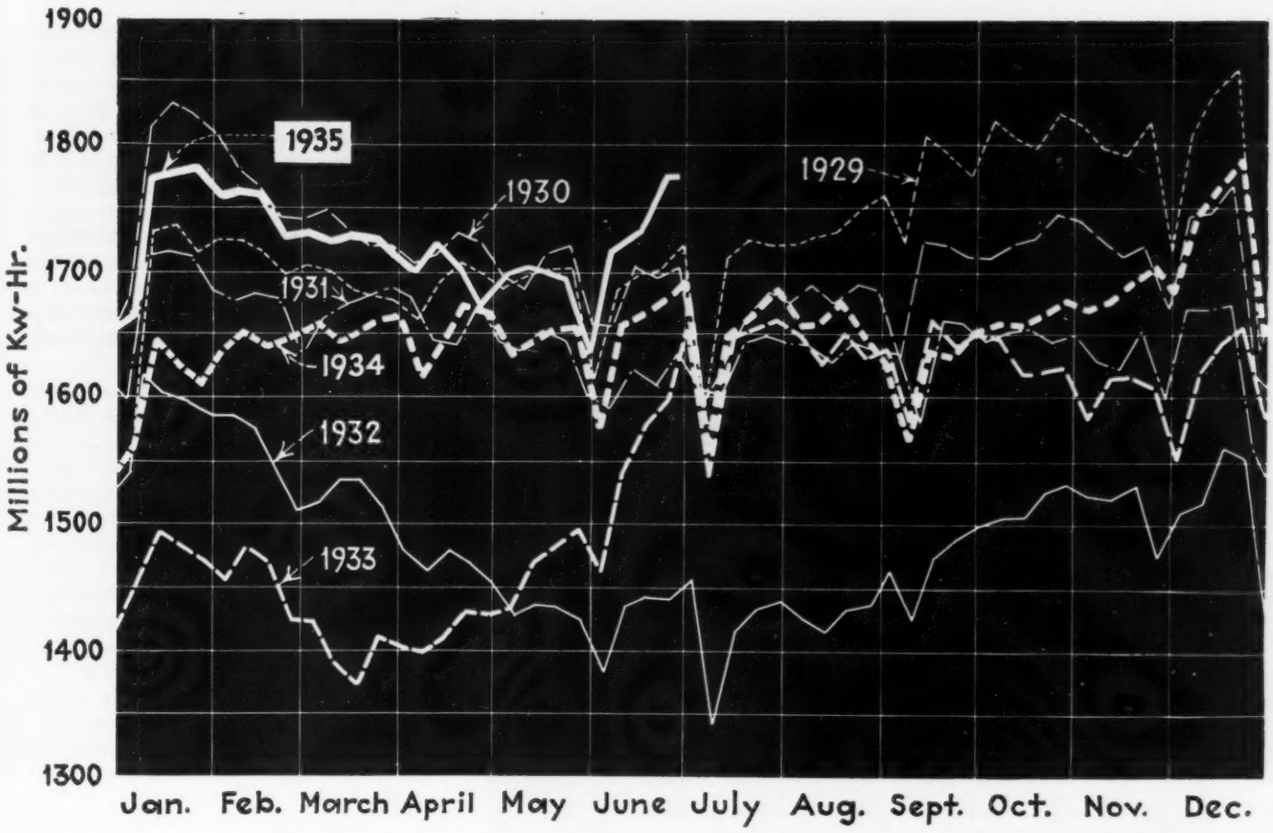
A.-C. Motors Used to Drill Deep Oil Wells

For several years direct current motors supplied by generators which were driven by internal combustion engines have been used in the drilling of oil wells. Recently for the first time on a well drilling to the deepest producing sand in the world (10,050 ft.) the internal combustion engine drive was replaced with an alternating current motor using power from a commercial power line. The user is the Denver Producing & Refining Company. The a.c. motor is 3 phase, 60 cycle, 2,200 volts running at 1,200 r.p.m. at 40 degrees and developing 400 hp. This test is being watched closely and if it continues to be as successful as drilling so far has proved it will mean a new source of power load for commercial companies serving drilling areas. All equipment was designed and installed by the Allis-Chalmers Manufacturing Company.

Output Soars to New High for June



Unusually vigorous acceleration of industrial activity is indicated by the weekly energy output of central stations during June. In the first week it rose higher than at any time in May. The second week brought another increase. It was in turn exceeded in the third week by nearly 2 per cent with a total, according to the Edison Electric Institute, of 1,774,654,000 kw.-hr.

This latter surpassed that of the like periods in 1929 and 1930 by almost 4 per cent. It exceeded the figure for the best June week in any year by 3 per cent and established a new all-time high for a summer week. It virtually matched the four highest weeks of last winter, which, in view of the normal seasonal ebb and flow, is extraordinary. With that exception it overshot the weekly output at any time of any year except the winter of 1929-1930. Finally, this rate of production was all but equaled in the fourth week, with 1,772,138,000 kw.-hr. and a lead of 5 per cent over 1934.

Weekly Output, Millions of Kw.-Hr.

1935	1934	1933
June 29...1,772	June 30...1,688	July 1...1,656
June 22...1,775	June 23...1,675	July 2...1,598
June 15...1,743	June 16...1,665	June 17...1,578
June 8...1,724	June 9...1,655	June 10...1,542
June 1...1,629	June 2...1,576	June 3...1,461
May 25...1,696	May 26...1,655	May 27...1,494

Per Cent Change from Previous Year

Region	Week ended June 29	June 22	June 15
New England	+ 6.7	+ 5.7	+ 3.2
Middle Atlantic	+ 4.4	+ 6.7	+ 4.5
Central Industrial	+ 2.3	+ 3.3	+ 0.4
West Central	+ 3.3	+ 4.5	+ 3.2
Southern States	+ 6.8	+ 6.9	+ 6.0
Rocky Mountain	+28.4	+28.7	+32.7
Pacific Coast	+ 2.1	+ 3.2	+ 6.2
United States	+ 5.0	+ 6.0	+ 4.

May Energy Up 4 Per Cent

Public utility plants in May generated 4 per cent more energy than a year ago, the total rising to 8,014,000,000 kw.-hr., according to the U. S. Geological Survey. This indicates a larger output than in any preceding month since January. Totals for the first four months, in millions of kilowatt-hours were: January 8,349, February 7,494, March 8,011, April 7,818.

Average daily output was very slightly more than in March, but about 1 per cent less than in April. The latter change was normal; equality with March was unusual. The largest total for the month was recorded in 1929; the present figure missed this by only 0.9 per cent.

Production from water power was exceptionally large. It rose to 47 per cent of the total and for the second consecutive month the average daily amount from this source was the largest for any month.

The Geological Survey reports cover not only central stations but all public utility plants except very small ones. Regional changes in per cent compared with 1934 were as follows:

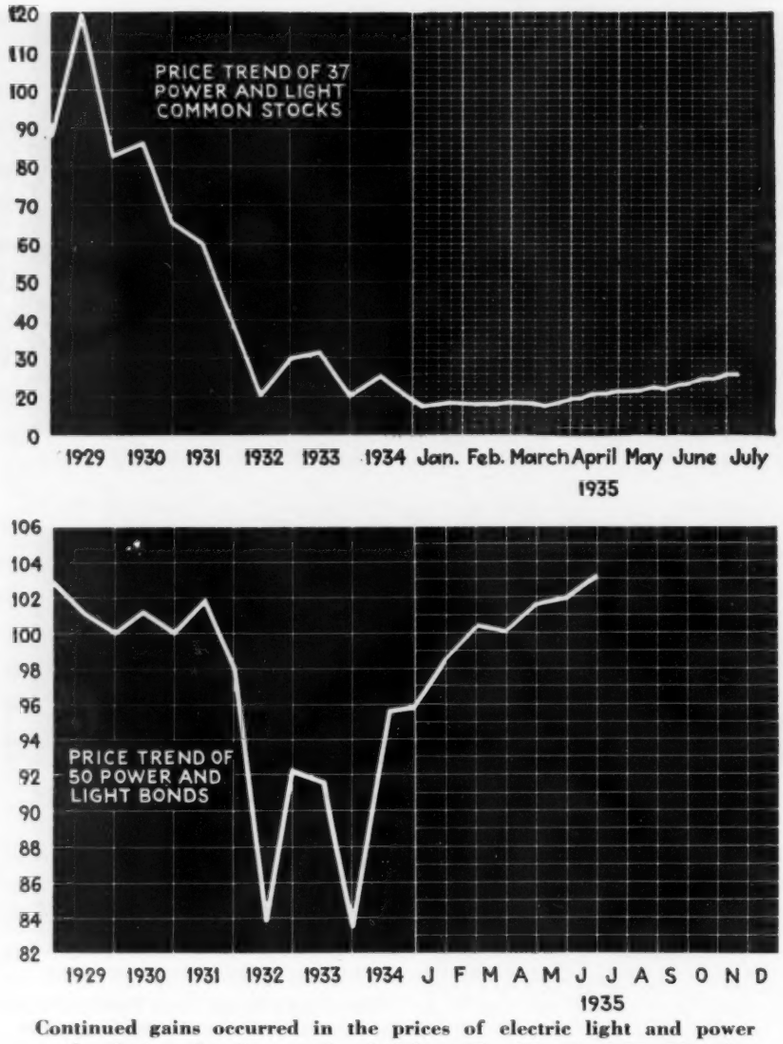
	Feb.	Mar.	Apr.	May
United States	+ 6	+ 4	+ 5	+ 4
New England	+ 4	+ 3	+ 5	+ 3
Middle Atlantic	0	— 1	+ 3	+ 3
East No. Central	+ 7	+ 2	+ 6	+ 3
West No. Central	+16	+17	+21	+14
South Atlantic	+13	+ 6	+ 4	+ 7
East So. Central	+18	+14	+ 9	+ 4
West So. Central	+ 5	+ 7	+ 9	+ 5
Mountain	+10	+10	+12	+10
Pacific	+ 5	+ 1	— 6	— 2

Another Big Increase in British Output

Official returns just rendered to the British Electricity Commission show that 1,326,000,000 units of electricity were generated by authorized undertakers in the United Kingdom during May, compared with the revised figure of 1,125,000,000 units in May, 1934. This constitutes an increase of 17.9 per cent over last year.

During the first five months of 1935 the total amount of electricity generated by authorized undertakers was 7,355,000,000 units, compared with the revised figure of 6,583,000,000 units for the corresponding period of 1934, representing an increase of 11.7 per cent.

Utility Stocks and Bonds Advance



Continued gains occurred in the prices of electric light and power stocks during the first week of July. The *Electrical World* index advanced to 26.7 from 26.1 the closing week of June. Bonds also advanced—June, 103.4; May, 102.1

Abitibi Receiver Petition Denied by Toronto Court

In view of a dispute over the petitioner's $1,003,093 claim, Justice J. A. McEvoy in Bankruptcy Court at Osgoode Hall, Toronto, dismissed the petition of the Hydro-Electric Power Commission of Ontario for an order that the Abitibi Electric Development Company, Ltd., Toronto, be adjudged bankrupt and a receiving order be made (ELECTRICAL WORLD, June 8, page 84). The commission claims the sum for electric power held available for and purchased by the Abitibi Electric Development Company, Ltd., pursuant to an agreement dated October 1, 1931. Petitioners alleged that within six months before the presentation of the petition the company, a subsidiary of the Abitibi Power & Paper Company, had ceased to meet its liabilities generally as they became due. "I am going to allow the parties to fight it out in the proper court and I am going to dismiss the petition without cost." concluded Justice McEvoy.

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Pasadena Approves Boulder Dam Contract

The Pasadena, Calif., city Board of Directors has approved a contract with the city of Los Angeles for delivery of Boulder Dam power. The contract calls for the payment by Pasadena of $10,500,000 over a period of 50 years. In executing the contract the city officials aproved the plan for change from 50 to 60-cycle frequency for electrical service in Pasadena. Expenditure of approximately $300,000 to alter electrical equipment to meet the change was authorized by the board. The city will bear the expense of changing the electrical equipment of consumers for the 60-cycle frequency.

Large Bond Issues Floated by Utilities; New Listings

Several of the large utility bond issues which were listed with the Securities and Exchange Commission in mid-June (ELECTRICAL WORLD, June 22, page 48) have been placed on the market. Southern California Edison Company, Ltd., has issued refunding mortgage gold bonds, priced at 98½ per cent and accrued interest, to the amount of $35,000,000. This offering together with the $73,000,000 of new bonds issued earlier in the year makes a total of $108,000,000 of refunding undertaken by the corporation during the current year.

With the purpose of retiring liens of subsidiaries, the Pacific Gas & Electric Company made an offering of first and refunding mortgage bonds totaling $30,000,000, the price being 104 per cent and accrued interest from June 1, 1935. The bonds were dated December 1, 1934, and mature December 1, 1964.

Consumers Power Company was represented with an offering of first lien and unifying mortgage bonds, priced at 100 per cent and accrued interest, a piece of financing involving a total of $18,594,000.

Central Hudson Gas & Electric Corporation issued a $9,765,000 offering and Southern Utah Power Company a $500,000 offering.

In addition to the new issues actually offered, several utility companies listed substantial offerings with the commission. Cleveland Electric Illuminating Company has filed with the commission a registration statement covering $40,000,000 of general mortgage bonds and the statement of the Public Service Company of Northern Illinois was for an issue of $16,000,000 of first lien and refunding 4½ per cent bonds. Notable among the issues because of the low interest rate of 3½ per cent proposed was $70,000,000 by the Duquesne Light Company to be used in refunding 4½ per cent bonds.

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Utility Seeks to Reorganize

Petition has been filed by the Northwestern Electric Company under Section 77b of the National Bankruptcy Act for reorganization under the first mortgage bond extension plan to which 83 per cent of the holders have given their approval. Hearing on the petition will be held in Portland, Ore., on July 15.

New York Metal Prices

	June 19, 1935 Cents per Pound	July 2, 1935 Cents per Pound
Copper, electrolytic	9.00*	8.00*
Lead, Am. S. & R. Price	4 00	4.00
Antimony	12 50	12.50
Nickel ingot	35.00	35.00
Zinc, spot	4.675	4.675
Tin Straits	51.00	51.75
Aluminum, 99 per cent	19—21	19—21

*Delivered Connecticut Valley

Trade Treaties Under Way With Eighteen Countries

In accordance with the amendment to the Tariff Act of 1930, which was passed by Congress June 12, 1934, the Department of State has announced reciprocal trade negotiations with eighteen countries. The conclusion of agreements with only five countries have been announced to date, and only three are in effect at this time, those with Cuba, Belgium and Haiti. Although concluded, agreements with Brazil and Sweden will not become effective until 30 days following ratification by their legislative bodies.

The other countries with which negotiations have been carried on are: Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Spain, Switzerland, The Netherlands, Finland, Italy, Canada and France.

In none of these agreements announced up to the present has the United States conceded any reduction of existing duties on electrical products being imported into this country.

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English General Electric Announces Record Profit

Annual report of the General Electric Company of England for the year ended March 31. 1935, shows profits of £1,184,483 ($5,922,415), compared with £971,481 ($4,857,405) for the preceding year. Fulfilling the anticipations of the more conservative forecasters, the ordinary dividend has been raised from 8 to 10 per cent. Total surplus on March 31 was £467.018 ($2,335,090).

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500,000 Lamps Certified

Results of the first year of lamp certification by the Illuminating Engineering Society were announced last week. At the end of the first year (June 1) more than 500,000 portable lamps were certified and 49 manufacturers in the United States were authorized to attach tags of certification on their lamps.

Type of Portable	Number Sold	Per Cent of Total
Study and reading	372,300	74.5
Semi-Indirect		
100/200/300 watt	95,700	19.1
250 watt	3,000	0.6
Indirect		
100/200/300 watt	15,450	3.0
250 watt	1,850	0.4
Wall	12,025	2.4
Total	500,325	100.0

In analyzing these figures, D. W. Atwater, general secretary of the society, pointed to the growing popularity of the semi-indirect and indirect floor lamps, particularly those using the indirect three-light lamps. "The portable lamp manufacturers are to be congratulated," Mr. Atwater said, "upon the co-operative spirit they have given to certification, and their willingness to accept constructive suggestions to improve their product. . . . With the extension of certification privileges to more and more of portable lamp manufacturers, with the proposed advertising program for certified lamps, and with the increasing demand for better light, the industry can expect a further increase in sales from certification."

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Net Sales Data Compiled

Compilation of the data on Net Sales to Domestic Customers of all products which came within the scope of the Electrical Manufacturing Industry Code has been completed and published in summary form by the National Electrical Manufacturers' Association. This compilation shows that 1,703 companies reported total sales of $381,102,000 for the last half of 1934, as compared with 1,528 companies reporting total sales of $384,984,000 for the first half of that year.

Classification	Number of Companies Reporting	Value (000 Omitted)
Appliances	225	$25,695
Construction material	158	14,615
Dry batteries and flashlights	21	9,562
Electric tool	65	2,422
Generation	33	7,139
Illumination	100	4,913
Incandescent lamp	34	29,684
Industrial apparatus	212	44,816
Installation devices	275	18,656
Portable lamp and shade	206	8,537
Radio receiving tube	28	8,637
Radio and television parts and accessories for entertainment	83	9,620
Radio and television sets for entertainment	54	34,364
Radio transmitting and public address apparatus and commercial receiving apparatus	62	4,258
Refrigeration	31	28,055
Roughing-in material	101	9,162
Specialties	113	9,298
Telephone equipment	21	2,771
Transmission and distribution	155	31,640
Electric transportation	24	6,492
Wire and cable	164	50,207
X-Ray and electro-medical	71	4,718
All other renewal parts	79	8,286
All other electrical products	....	7,556
	1,703	$381,102

Copies of this summary may be secured upon request to the statistical department of the National Electrical Manufacturers' Association.

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Square D Plan Approved

Announcement has been made by F. W. Magin, president of Square D Company, that requests for new 5 per cent debentures being exchanged for 6 per cent debentures now outstanding have exceeded the amount of new debentures to be offered under the plan and the books have, accordingly, been closed. Under terms of the debenture plan to fund $750,000 of 6 per cent debentures outstanding the company recently arranged to call half the issue through bank loans amounting to $375,000, carrying interest of 4 per cent, and to exchange the remaining half for new 5 per cent debentures.

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R.F.C. Makes Loans to Electric Manufacturers

Industrial loans totaling $772,000 have been made up to April 1 by the Reconstruction Finance Corporation to industries manufacturing electrical machinery, apparatus and supplies. These loans are made primarily to furnish working capital, but when found essential a portion of the loan may be used for the purchase of equipment, for the payment of taxes, or for installment on mortgages.

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Housing Program Advances, General Electric Reports

Exceptional progress toward its goal of the construction of 1,200 new homes throughout the country was signified this week by officials of the General Electric Company with the announcement that local committees in 185 cities and communities throughout the nation were now engaged in the "New American" home-building program, with many others being added to the roll weekly. Given added impetus by the support of the Federal Housing Administration launched on June 15, quotas totaling approximately 450 houses of the new design have been assumed by the committees, and of these 125 are definitely in the hands of contractors and builders.

Because of the extensive territory covered by the program and the fact that its working-out is in the hands of purely local groups, exact figures are not available at the headquarters in New York. Already photographs have been sent in showing houses under construction, and in connection with the F.H.A. ceremonies on June 15 ground was broken in many cities, including Washington, Worcester, Syracuse, Dubuque and Pittsburgh. According to the plan announced recently, General Electric is helping to support the program through the active co-operation and financial support of its dealers and distributors, and will later assist in the sale of the houses through local and national advertising.

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Silvray Lamps Win Approval

Announcement has been made by Silvray Lighting, Inc., New York, that Silvray processed lamps have won the recognition of the Mazda lamp manufacturers. As of July 1, Silvray processed (bowl-silvered) lamps have been made available to all distributors of General Electric, Westinghouse and Mazda licensee manufacturers.

Air Conditioning Group Discusses Standardization

More than forty representatives of the leading manufacturers of air conditioning equipment met recently at Hot Springs, Va., in a session marked by sound optimism for a substantial increase in business volume in 1935. The Air Conditioning Manufacturers' Association's annual meeting was the occasion for the gathering, presided over by P. A. McKittrick of the Parks-Cramer Company of Fitchburg, Mass. Studies in air conditioning engineering standardization which have been progressing for many months received particularly deep attention from these manufacturers' representatives. Mr. McKittrick was elected president of the association and J. F. G. Miller of the B. F. Sturtevant Company was elected vice-president.

At the same time a large group of manufacturers of refrigerating machinery met in Hot Springs at the annual meeting of the Refrigerating Machinery Industry. In his report to the industry, W. S. Shipley, chairman of the Code Authority, stated that while operations under the code had resulted in a better understanding between members of the industry and in a greater unity of purpose, that was the only item on the credit side of the code-operating ledger of the industry. Mr. Shipley said in part: "The more general public acceptance of air conditioning has helped give factory production curves an upward trend and it has kept our industry from slipping as far into the red as we were in the dark days of 1932 and the almost-as-gloomy period of 1933. I believe that in air conditioning lies one of the most potent industrial factors for returning prosperity, certainly so far as the durable goods industries are concerned." Stuart B. McNaught, attorney, of York, Pa., discussed New Deal policies.

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Electric Truck Shipments

May shipments of electric industrial trucks and tractors, as reported by ten leading manufacturers, totaled 67, as compared with 75 in April, and 63 in May, 1934. These statistics were released recently by Director William L. Austin, Bureau of the Census, Department of Commerce.

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New Three-Light Lamp

Development of a new inside-frosted lamp, designed primarily for the I.E.S. "Better-Sight" type of portable for study and reading, and providing three different levels of illumination from a single bulb, has been announced by the incandescent lamp department of the General Electric Company at Nela Park, Cleveland. The new lamp is really a smaller edition of the present 100-200-300-watt "Indirect-Three Lite" which General Electric announced in May, 1934. It contains two filaments, a 50-watt and a 100-watt, each of which may be burned individually or in combination with the other.

British Seek Repeal of Neon Rectifier Duty

Representation has just been made to the British Board of Trade under the Finance Act of 1926 for the exemption from duty of imported grid-controlled rectifiers of the cold-cathode neon type. Under this act "the Treasury may by order exempt from the duty imposed by Section 1 of the Safeguarding of Industries Act, 1921, as amended by this act, for such period as may be specified in the order, any article in respect of which the Board of Trade is satisfied on a representation made by a consumer of that article that it is not made in any part of his Majesty's dominions in quantities which are substantial having regard to the consumption of that article for the time being in the United Kingdom, and that there is no reasonable probability that the article will within a reasonable period be made within his Majesty's dominions in such substantial quantities."

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Westinghouse Gets Orders

An order amounting to approximately $1,000,000 has been awarded to the Westinghouse Electric & Manufacturing Company for motors, power supply and control units and other electrical equipment by the Great Lakes Steel Corporation for new wide hot and cold strip mills in Detroit. Large size electrical units in the order include eight 1,250-hp. direct-current motors and four 6,000-kw. motor-generator sets. Motors and control equipment for a new 42-in. reversible cold strip mill of the Republic Steel Company at Warren, Ohio, has also been awarded to Westinghouse. The order amounts to approximately $100,000.

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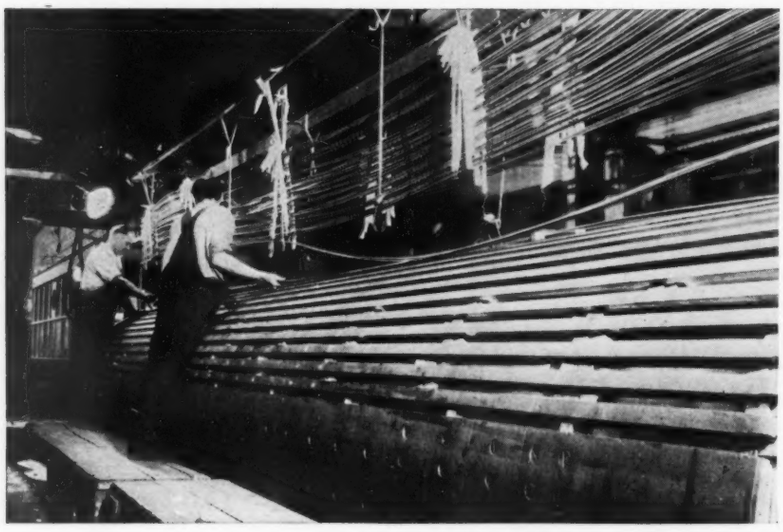
Curtis Meeting Postponed

For the third time the annual stockholders' meeting of the Curtis Lighting Company has been postponed due to lack of a quorum. Originally scheduled for March 10, the meeting was then deferred until May 22 and at that time was postponed further to June 19, when another date was set for July 10. At the meeting stockholders will be asked to approve a charter amendment increasing the authorized shares of capital stock from 150,000 of no-par value to 600,000 of no-par value and provide for the exchange of the 90,000 shares now outstanding on the basis of four new shares for each old share and for the issuance of additional shares at such times and in such amounts as the directors may determine. The increase in the number of shares is proposed for the purpose of creating a broader market for the shares of the company.

WINDING LARGEST TURBO ROTOR

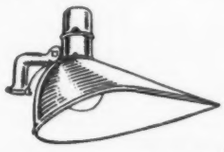


Eight and one-half miles of copper strip weighing 32,000 lb. is being wound on this rotor for the Philadelphia Electric Company's single-shaft turbo-generator, the world's most powerful unit of its type. Being built by the Westinghouse Electric & Manufacturing Company for installation in the Richmond station, it is rated at 183,333 kva., 165,000 kw., 13.8 kv., and will operate at 1,800 r.p.m. with a peripheral speed of 28,200 ft. per minute, the highest of any machine built by the company

Inside Facts about Outdoor Lighting

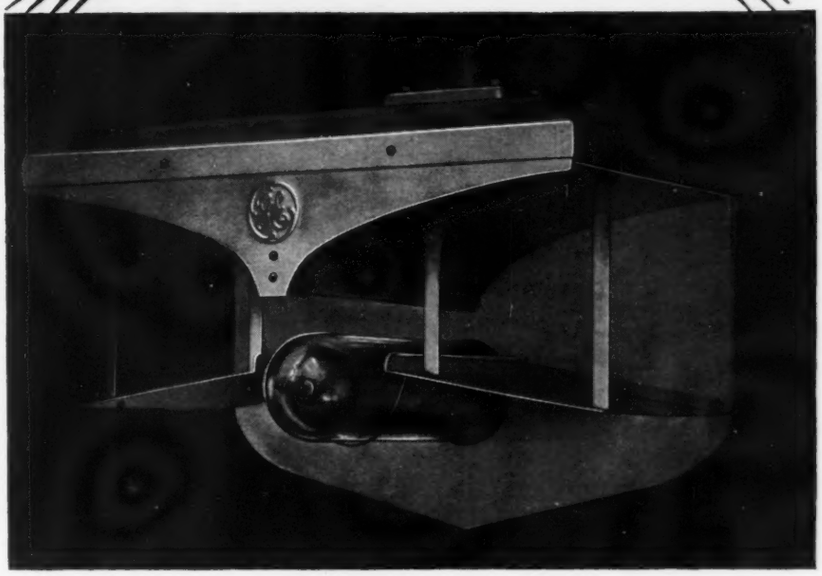
G-E disk film cutouts are given definite voltage ratings, and are marked by color as well as by the usual stamped ratings: brown, breakdown between 50 and 90 volts; black, between 100 and 200 volts; red, between 250 and 350. Because of special methods of control in the manu facture of these totally enclosed cutouts. better than 99% of them break down within their ratings.

General Electric series street-lighting sockets have two unusual features that make them superior to all other sockets on the market. The heavy, nickle-plated phosphor-bronze prongs, which make the contact in the receptacle, are the same two pieces of metal that make contact with the base of the lamp. There are no riveted or soldered connections to cause heating and radio interference. The insulating shell, of porcelain or of white or black compound, is held to the rest of the socket by two screws. In case of breakage, this shell can easily be replaced — at small cost.



A new open-type floodlight, AL-46, designed especially for filling stations, has recently been announced by General Electric It will take a 300- to 1500-watt lamp; lists as low as $26.00; maintains the same high standard of quality established by other G-E floodlights. Publication GEA-2099 gives complete information on this unit.

HERE'S ONE WAY TO ENCOURAGE HIGHWAY LIGHTING



INSTALL LIGHTING THAT ATTRACTS ATTENTION—USE G-E SODIUM LAMPS

NO one can overlook an installation of sodium lighting. The golden-orange color is distinctive; the light is adequate and glareless. The simplest way to encourage highway lighting is to put in a stretch of sodium units. It will compel attention — it will receive favorable comment. It will prove that utilities are progressive—are working for the public good.

A combination of new, lower prices; new, longer lamp life; and new, higher efficiency makes the G-E 10,000-lumen sodium lamp and luminaire definitely competitive in cost with incandescent lighting of the same rating.

More than 80 different users of this lamp have proved its reliability—are gaining prestige from its use. Let us send you our new publication, GEA-2062, describing the operation and characteristics of these sodium lamps. Write General Electric Company, Dept. 6X-201, Schenectady, New York.

500-143

GENERAL ELECTRIC

Inspection Practice With Oil Breakers

Frequencies of inspections of oil circuit breakers, bases for determining inspection schedules, parts requiring most attention, types of inspection given, frequencies of checking operating time and principal defects found were indicated in a recent report by E. S. Fitz of the operation and maintenance division of the E.E.I. electrical equipment committee. The data are based on reports from 25 operating companies, although it will be noted that all did not report on some items. It reveals a great variance of practice, but does indicate maximum intervals seldom exceeded and also that some companies consider it desirable to make more frequent inspections than the majority. How much the intervals are based on experience or tradition, age or type of equipment, importance of circuit, etc., is not indicated. It does show, however, an inclination toward basing inspections on cumulative "duty" since the last inspection.

Number of Companies Reporting Approximately the Same Schedule for Inspection of Breakers, the Parts Requiring Most Attention, and Principal Defects Found

In all of the replies from the twenty-five operating companies to the E.E.I. questionnaire there was evidence that much thought is being given to the question of maintenance practice. In the near future the committee expects a more scientific basis will be adopted for determining such practice.

INSPECTION SCHEDULE

Voltage Class, Kv.		Monthly	Quarterly	6 Mo.	1 Yr.	2 Yrs.	5 Yrs.	Duty	Companies Reporting Total
2.3-7.5.....	Contacts	1	1	3	7	6	1	4	23
	Mechanism	2	2	3	7	6	..	3	22
10-25.....	Contacts	2	..	1	9	7	..	1	20
	Mechanism	2	1	1	7	6	..	1	18
30-75.....	Contacts	..	..	1	8	5	..	3	17
	Mechanism	..	2	1	6	5	..	3	17
110, Up.....	Contacts	..	..	2	5	2	..	3	12
	Mechanism	..	2	2	1	2	..	5	12
Total. 2.3, Up.	Contacts	3	1	7	29	20	1	11	72
	Mechanism	4	7	7	21	19	0	12	70

Basis for Determining Inspection Schedule

Voltage Class, Kv.	Time	Duty	Both	Total
2.3-7.5...	7	6	8	21
10-25.....	6	8	4	18
30-75.....	7	..	10	17
110, Up...	..	..	13	13
Total...	20	14	35	69

Parts Requiring Most Attention

Voltage Class, Kv.	Contacts	Mechanism	Oil	Bushing	External	Others	Companies Reporting Total
2.3-7.5...	15	6	7	..	..	..	28
10-25.....	16	8	8	1	1	..	34
30-75.....	11	5	6	..	..	1	23
110, Up...	6	6	5	1	..	1	19
Total...	48	25	26	2	1	2	104

Type of Inspection

	2.3-7.5 Kv.			10-25 Kv.			30-75 Kv.			110 Kv.-Up		
	Manually*	Electrically	Automatic*	Manually*	Electrically*	Automatic*	Manually*	Electrically*	Automatic*	Manually*	Electrically*	Automatic*
Periodic.....	22	15	5	20	16	4	17	15	5	11	10	3
When installed.....	..	1	1	..	1	..	..	1	1	..	2	1
After trouble	..	1	2	..	..	1	..	..	2	..	1	2
No schedule.	..	3	10	1	5	9	..	1	9	1	..	6
Total.....	22	20	18	21	22	14	17	17	17	12	13	12

*Manually—Indicates operating parts by hand. Electrically—Indicates operating parts by electric current through load box. Automatically—Indicates operating parts by creating fault condition.

Check of Operating Time

Voltage Class, Kv.	Periodic	After Trouble	No Check	Companies Reporting Total
2.3- 7.5...	8	6	6	20
10.0-25.0...	6	8	6	20
30.0-75.0...	8	..	9	17
110, Up....	5	..	12	17
Total....	27	14	33	74

Principal Troubles Found

Defects Found	2.3-7.5 Kv.	10-25 Kv.	30-75 Kv.	110 Kv.-Up	Companies Reporting Total
Oil.....	1	0	3	1	5
Contacts...	3	5	6	5	19
Mechanism	3	6	4	1	14
Bushing...	2	2	6	6	16
Control....	0	1	2	0	3
Total....	9	14	21	13	57

Reduced Storeroom Requirements

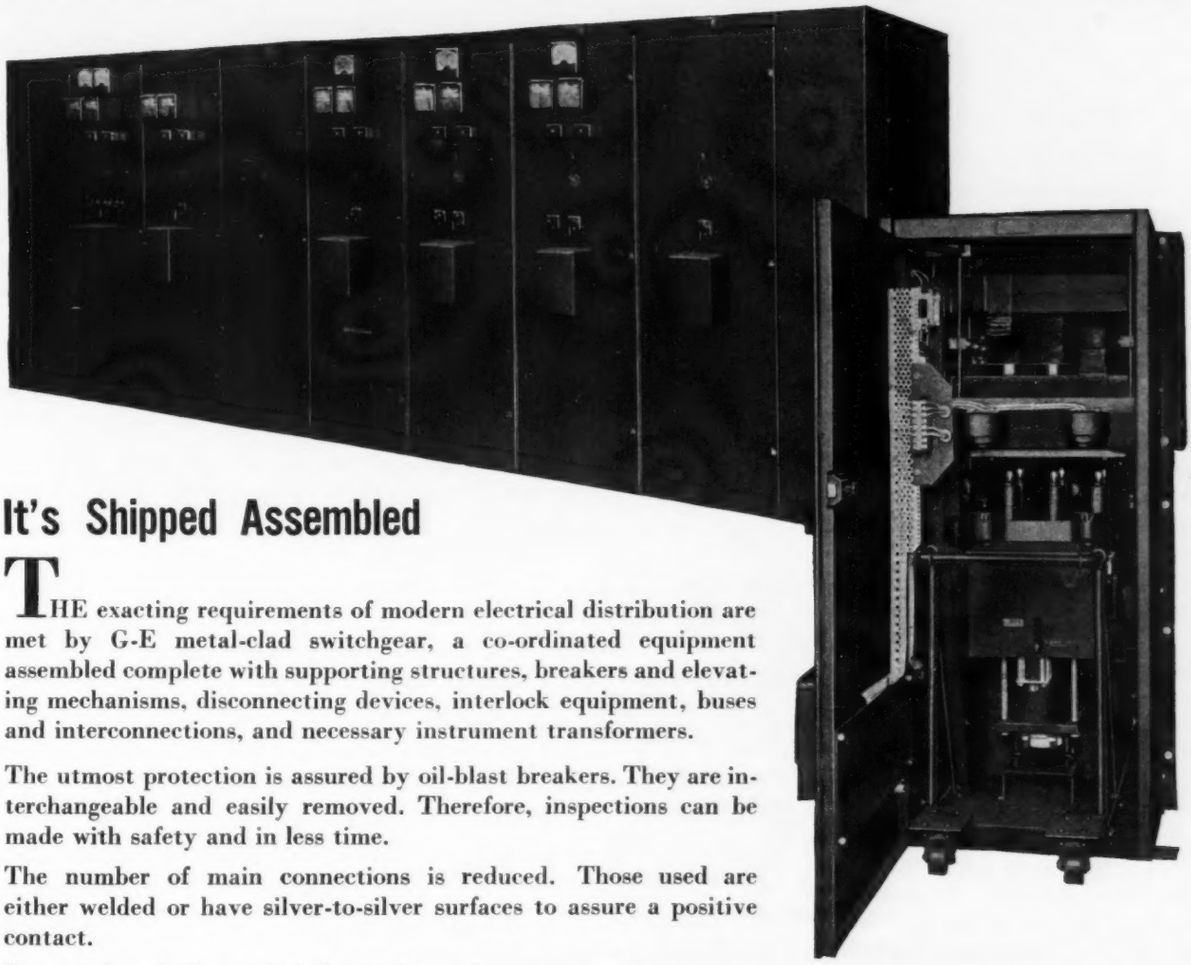
By G. P. LANDWEHR
Philadelphia Electric Company

Storeroom stock on the Philadelphia Electric System was reduced from $3,300,000 to $2,800,000 last year, and 2½ times this amount in 1933, by weeding out little-used stock, concentration on fewer varieties, adapting purchases to demands, delivery and price, etc. Working capital was correspondingly reduced and less space needed for storage. The greatest reduction was in electrical distribution stocks.

Prior to 1931 larger stocks were required because of more construction work and rush extensions. Changed conditions warranted a revision in the amount of stock kept and likewise the

Modern Switchgear Is Metal-clad

REDUCES YOUR MAINTENANCE — AND IT'S SAFER



It's Shipped Assembled

THE exacting requirements of modern electrical distribution are met by G-E metal-clad switchgear, a co-ordinated equipment assembled complete with supporting structures, breakers and elevating mechanisms, disconnecting devices, interlock equipment, buses and interconnections, and necessary instrument transformers.

The utmost protection is assured by oil-blast breakers. They are interchangeable and easily removed. Therefore, inspections can be made with safety and in less time.

The number of main connections is reduced. Those used are either welded or have silver-to-silver surfaces to assure a positive contact.

Present-day G-E metal-clad switchgear has stronger construction because of its greatly reduced sizes: its lighter weight has reduced handling costs. Its application is not restricted. Specify this modern self-contained equipment for all new construction and when modernizing plants. Call the nearest G-E office, or General Electric Co., Schenectady, N. Y.

Breaker lowered on truck for removal and inspection

820-17

GENERAL ELECTRIC

frequency of ordering. Storeroom stocks distributed among several divisions were centralized in Philadelphia —the center of greatest demand— thereby profiting by diversity of demands. Increased standardization of the materials used cut down the number of items and was made possible by co-operation of the engineering and operating departments. They helped by forecasting the amount and time of their needs more accurately so stocks do not have to be ordered so far in advance and held. Buying closer to time of need is also made possible by recognizing seasonal demands.

The number of some items and amount of each have been greatly reduced because of greater reliability of modern equipment, greater interchangeability of parts, versatility of welding for repairs and the standardization of poles. Closer estimate of amounts of material required on each job and stock issuance only on work orders has helped.

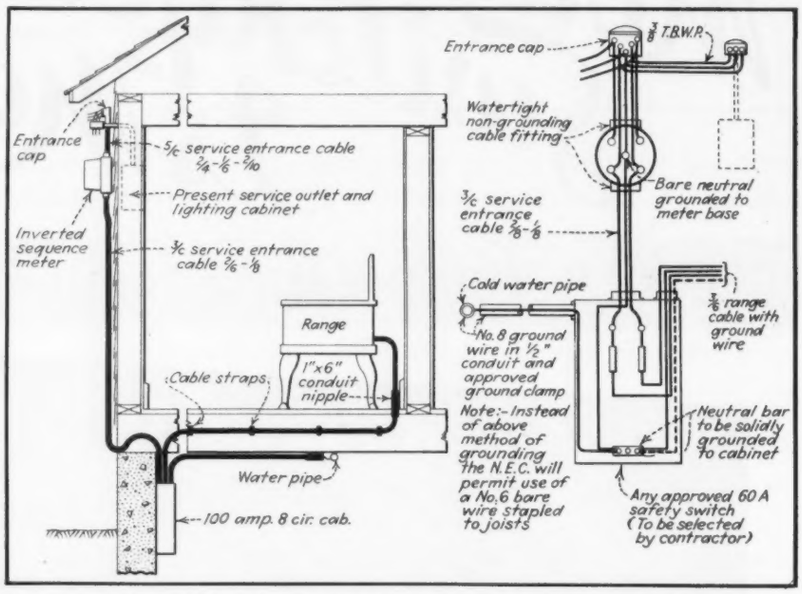
Slow-moving stock has been reduced by periodically circulating lists thereof among the engineering and operating departments and checking all purchase orders to ascertain if existing stocks can serve. Some of this stock has found use on properties of affiliated companies. Manufacturers and second-hand dealers afford other outlets. Minimum stocks to carry are periodically revised and based on current demands and delivery.

Centralization of repairs has also helped reduce stock because rehabilitated equipment can be returned to stock more quickly. However, some returned equipment is not rehabilitated until need for same is clearly indicated. Transformers and fuses are refilled by their manufacturers. Line hardware is regalvanized outside. Switches are repaired in the shop. Removed poles are cut back for reuse.

Excessive demands on transportation equipment are avoided by having each division storeroom anticipate its current demands on the central storeroom and having shuttle trucks make deliveries to the division daily or weekly. In the central area, construction, maintenance and trouble trucks are loaded during the night and ready for the gangs in the morning. Only the driver comes to the warehouse and picks up the crew on his way to the job. For suburban areas the supplies are sent out the previous afternoon so their trucks can be loaded in the morning.

Outdoor Metering for Ranges

By S. B. CLARK*
Northwestern Electric Company, Portland, Ore.


Entrance cap
3/8 T.B.W.P.
Watertight non-grounding cable fitting
Entrance cap
5/c service entrance cable 2/4-1/6-2/10
Present service outlet and lighting cabinet
Bare neutral grounded to meter base
3/c service entrance cable 2/6-1/8
Inverted sequence meter
3/c service entrance cable 2/6-1/8
Cold water pipe
3/c range cable with ground wire
Range
No. 8 ground wire in 1/2" conduit and approved ground clamp
Cable straps
1"x6" conduit nipple
Note:- Instead of above method of grounding the N.E.C. will permit use of a No. 6 bare wire stapled to joists
Neutral bar to be solidly grounded to cabinet
Water pipe
100 amp. 8 cir. cab.
Any approved 60 A safety switch (To be selected by contractor)

Difference of about $10 in favor of service entrance cable exists where an adequate service for range only is to be added to simultaneous conversion of the existing lighting meter to outdoor inverted sequence.

Cost of Adequate Service Installation for Range Only

ADDITION TO LIGHTS IN OLD RESIDENCE

A—Using Rigid Conduit

Item	No. Reqd.	Unit Cost	Extended Cost
Service			
1½-in. Conduit, ft.	15	$0.1829	$2.7435
1½-in. Conduit locknuts	2	0.0330	0.0660
1½-in. Conduit bushings	1	0.0545	0.0545
1½-in. LB Condulet	2	1.0290	2.0580
1½-in. Condl. blank covers	2	0.3136	0.6272
1½-in. Entrance condulet and cover	1	0.5860	0.5860
1½-in. Pipe straps	5	0.0135	0.0675
No. 4R. C. stranded wire, ft.	15	0.03815	0.5775
No. 6R. C. stranded wire, ft.	42	0.02985	1.2537
No. 8R. C. stranded wire, ft.	20	0.01482	0.2964
Misc.—tape, solder, etc.	..	.....	0.5000
Material			$8.83
Labor			7.00
Range			
1-in. Conduit, ft.	15	$0.1352	$2.0280
1-in. Conduit locknuts	4	0.0215	0.0860
1-in. Conduit bushings	2	0.0415	0.0830
No. 6R. C. stranded wire, ft.	50	0.02985	1.4925
Outlet box, 4 11/16 x 4 11/16 x 2 1/2 in.	1	0.53600	0.5360
4 11/16-in. outlet box cover, plain	1	0.21600	0.2160
Federal bushings No. 3A	1	0.06000	0.0600
1-in. Pipe straps	5	0.01030	0.0515
60A. 250-V. safety switch	1	(Price depends on selection)	
Misc.—tape, solder, etc.	Job	1.00000	0.7500
Material			$5.30
Labor			3.00
Grounding			
½-in. Conduit, ft.	10	$0.07370	$0.7370
½-in. Conduit, locknuts	2	0.00665	0.0133
½-in. Conduit, bushings	1	0.01015	0.0102
½-in. Groundlet	1	0.60000	0.6000
Ground jumper—12-in.	1	*0.2620	0.2620
No. 8 R.C. wire, ft.	12	0.01482	0.1778
Material			$1.80
Labor			1.00
Total material			$15.93
Total labor			11.00
Grand Total			$26.93

B—Using Service-Entrance Cable

Item	No. Reqd.	Unit Cost	Extended Cost
Service			
Entrance cap. No. 5536	1	$0.4000	$0.4000
5/c—Entrance cable (3/4-1/2 3/10) ft.	5	0.2320	1.1600
3/c—No. 6 Entrance cable (3/6-1/), ft.	14	0.1417	1.9838
Box connectors—No. 3206.	2	0.2192	0.4384
Box connectors for 1-in. Bx	1	0.1500	0.1500
Cable straps	10	0.0272	0.2720
Misc.—tape, solder, etc.	..	.....	0.2500
Material			$4.65
Labor			4.00
Range			
3/c—No. 6 Range cable (with gnd. wire), ft.	17	$0.1440	$2.4480
1-in. Conduit, ft.	1	0.1352	0.1352
1-in. Conduit, bushings	2	0.0415	0.0830
Cable straps	10	0.0272	0.2720
60A. 250-V. safety switch.	1	(Price depends on selection)	
Misc.—Tape, solder, etc.	Job	.....	0.2500
Material			$3.19
Labor			2.00
Grounding			
½-in. Conduit, ft.	10	$0.07370	$0.7370
½-in. Conduit, locknuts	2	0.00665	0.0133
½-in. Conduit, bushings	1	0.01015	0.0102
½-in. Groundlet	1	0.60000	0.6000
No. 8 R.C. wire, ft.	12	0.01482	0.1778
Material			$1.80
Labor			1.00
Total material			$9.64
Total labor			7.00
Grand Total			$16.64

*Excerpted from paper presented to engineering division meeting of Northwest Electric Light and Power Association in Portland.

The BOTTOM PRICE for Top Quality

in a 1½-ton 6-cylinder INTERNATIONAL TRUCK

The 1½-ton International Model C-30 with stake body. Other body types available for all hauling needs.

● Increased demand has greatly increased the production on the new International Model C-30, and the result is the lowest price that International Harvester has ever put on a 1½-ton, 6-cylinder truck.

That increased demand is the direct result of a combination of performance and economy in a modern truck that meets the widest range of hauling requirements.

See the Model C-30 or any other International at the nearby branch or International dealer's showroom. Look over the mechanical superiorities that have enabled International owners in every line of business to operate their trucks at lower cost for a long lifetime of service.

INTERNATIONAL HARVESTER COMPANY
OF AMERICA *(Incorporated)*
606 So. Michigan Ave. Chicago, Illinois

$595 f. o. b. factory for the 1½-ton, 6-cylinder, 133-inch wheelbase Model C-30 chassis—standard equipment.

Also available for special needs, the 1½-ton, 4-cylinder Model C-20. Chassis prices as low as

$575 f. o. b. factory

Quick Facts About
INTERNATIONAL
1½-ton 6-cylinder Model C-30

Six-cylinder engine—78.5 horsepower—hardened exhaust-valve seat inserts—full-floating rear axle—133 or 157-inch wheelbase—any desired body style—most economical in operation of all trucks in its class—lowest priced 1½-ton, 6-cylinder model in International history. Other International sizes range from ½-ton to 10-ton with chassis prices as low as $400 f. o. b. factory.

INTERNATIONAL TRUCKS

Electrical Ovens Improve Silk Yarns

Electrically heated conditioning ovens used for setting the twist in silk and rayon yarns have been found definitely superior to old methods of steam setting, according to J. S. Hanckel, who spoke recently before the Interstate Power Club. Among the advantages claimed for these electric-conditioning ovens were: Saving of fuel, elimination of high-pressure steam requirements, positive control, identical duplication of results, improved strength of silk, the elimination of spotting, streaking and baking of the material, avoidance of injury to most delicate fabrics and longer bobbin life.

Before the introduction of electric-conditioning ovens silk was "set" by injecting steam under 60 to 85 lb. pressure into a cabinet ranging in size from 50 to 1,000 cu.ft. The silk wound on bobbins was placed on trays in the cabinet and subjected to this steam for 30 minutes to three hours, depending upon the grade and twist of the yarn.

Based on the principle that water vapor in small quantities would be sufficient to set the twist provided the air was heated to enable it to carry the maximum amount of moisture, ovens were built containing water pans equipped with immersion-type electric heaters controlled by an adjustable wet-bulb thermostat and provided with strip heaters controlled by an adjustable dry-bulb thermostat for heating the air. A centrally located fan at the top of the oven picks up the moisture-laden air after it has passed through the silk masses and deflects it symmetrically down through ducts at each side of the oven. This air is admitted to the chamber again near the floor, where it is heated by a number of strip heaters prior to picking up another burden of water vapor from the water pans. A recording controller furnishes continuous record of the oven wet- and dry-bulb temperatures.

Performance of Electric Silk-Conditioning Oven

Size of oven (inches)	86x43x66
Connected load (kw.)	24
Normal load (bobbins)	1600
Normal daily operating period (hours)	10
Average daily production (lb.)	1331
Average daily consumption (kw.-hr.)	69
Silk conditioned per kw.-hr. (lb.)	19.3

The boxes are insulated with rock wool, lined with monel metal, equipped with low water cut-off to protect immersion heaters, and are provided with a recording instrument for temperature and humidity records, and in some cases equipped with timers and visible signals and alarms to indicate when the silk may be removed.

The accompanying tabulation gives data on the operation of a typical oven which has a long and successful record.

One utility reports that nine silk-throwing mills have installed fourteen similar boxes, ranging from 10-60 kw. and totaling 340 kw. During the first four months of 1935 orders for five boxes totaling 128 kw. were placed and an additional 150 kw. is expected to be installed before the end of the year.

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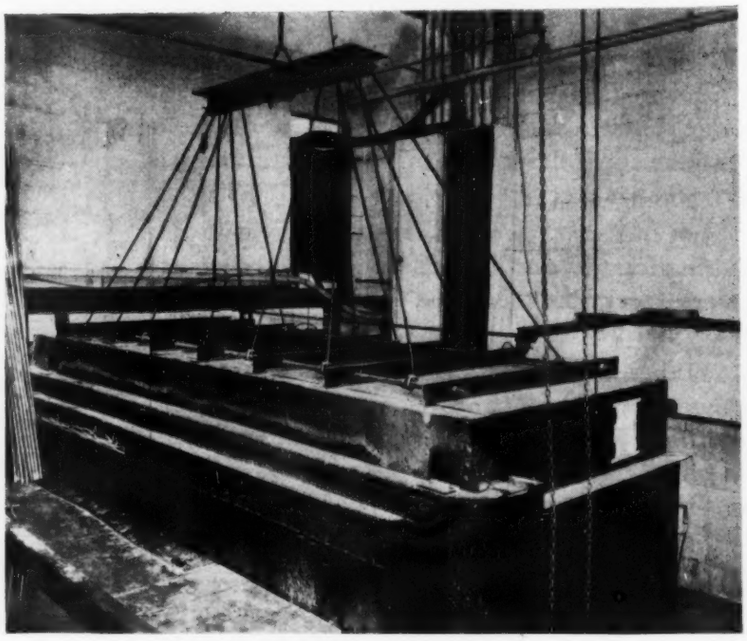
Heat-Treating Aluminum Alloys

By L. H. KNAPP
Sales Manager,
Hartford Electric Light Company

The Chance Vought Corporation, affiliated with the United Aircraft Corporation, East Hartford, Conn., has just recently applied electric heat treating to aluminum alloys, using a salt bath. The alloy, used considerably in airplane construction, is extremely soft after heating and quenching, but age hardens to a maximum hardness after 78 hours. The heating



168-kw. heat-treating bath for aluminum alloy

Liquid sodium nitrate, which melts at 586 deg. F. and has a specific heat of 0.43 in that form, is used to insure a uniform and exact temperature. Note sectional construction and support of cover to avoid warpage and heat loss. Cover need be raised only 12 in. for most products, but can be lifted and conveyed to one side for large products. The tank is covered with 12 in. of insulation consisting of layers of Super X, magnesia and rock wool.

limits are very narrow and the best results are obtained at 940 deg. F. To insure uniformity and exact temperature a liquid bath of sodium nitrate is used. This salt has a specific gravity of 2.257 (solid), a specific heat of 0.247 (solid) and of 0.430 (liquid), and a melting point of 586 deg. F. The temperature is actually held at 940 deg. F. plus or minus 3 degrees.

Due to the operating temperature and the slightly corrosive action of the liquid, the container was constructed of 1⅛-in. welded boiler plate. To reduce radiation losses the container is supported on 12-in. "Super X" insulation and surrounded by 6 in. of the same insulation plus 3 in. of magnesia and 3 in. of rock wool. The through metal from the hot zone to the outside was broken up as much as possible to reduce heat transfer.

On the average, it was found that the work could be produced with the cover open 12 in. for five hours a day and fully open one hour a day. During a month's operation the cover is completely closed 588 hours. The cover is therefore made with a large air seal to prevent circulation of air and heat from the bath to the atmosphere. It is lifted by a motor hoist, operated sidewise by a hand-operated rack and pinion. By using a sectional cover supported as shown, distortion is prevented and good contact is assured around the edges, minimizing heat losses.

The tank, measuring 14 ft. x 3 ft. 4 in. x 3 ft. 4 in. (inside), contains 19,000 lb. of salt heated by 24 7-kw. cast-in immersion units totaling 168 kw. This amount of power is required only about twelve hours to attain operating temperature, starting cold. After heating up, only eighteen units (126 kw.) are used, and during standby, with the cover on, four units (28 kw.) are used.

Tests have indicated a monthly consumption of 17,500 kw.-hr. The working conditions are excellent, operation is easy and certain and the operating cost compares very favorably with fuel. During the standby periods the bath is held at 940 deg. F. with only 11 kw.-hr. per hour, which is gratifyingly low.

Johns Manville Company designed the insulation and General Electric Company suggested the method of heating.

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Better Product With Electric Iron

Manufacturers who have difficulty in getting repeat orders for their products will frequently find that excessive maintenance or prolonged outages of their equipment for repairs are often the cause. Even those who have an enviable market can increase their reputation for reliable products by minimizing such operating objections. That is what the Riley Stoker Company did.

Castings that are subjected to severe abrasion in coal-pulverizer mills have been greatly improved in hardness and durability by using electric-furnace iron instead of air-furnace white iron as formerly. Formerly the iron used had a hardness of 340 (Brinell), compared with 600 at present. Whereas only 2,024 tons of coal could be pulverized formerly per 100 oz. of metal loss in the castings, more than twice as much (4,166) can now be processed with the same metal loss. The metal loss per 100 tons of coal was formerly $0.0154, but is now about 63 per cent of that, or $0.0097.

The reasons for the improved performance given by the Detroit Electric Furnace Company, which reported the preceding information, are: "The alloy found most successful and now used contains both nickel and chromium. Nickel is a graphitizer and strength builder, while chromium is a carbide-forming element. In order to utilize the full advantages of both elements, a high degree of melting control is essential. Such control is readily available with the indirect arc rocking furnace. Any combination of time, temperature and furnace atmosphere can be maintained consistently without the loss of expensive alloying elements.

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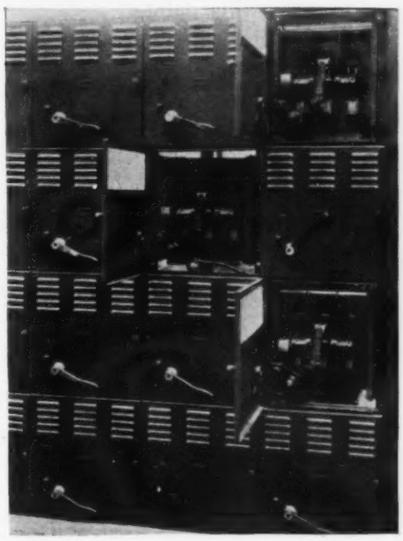
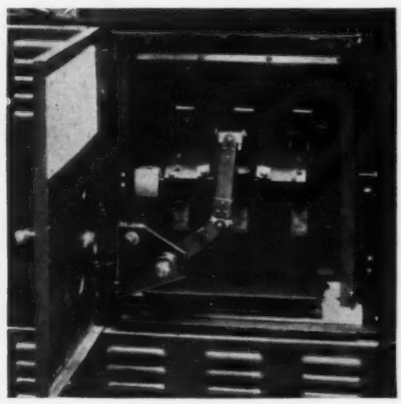
Compact Dead-Front Switch Mounting

One section of the switchboard at the Pennsylvania Railroad's new Newark station resembles externally those "dime-in-the-slot" lockers found in some railroad stations. In this section, measuring 7 ft. wide by 7½ ft. high, are four tiers of sixteen ventilated steel doors, each with a lever and a push button on the face. Open a compartment, however, and the resemblance ends.

Inside all except one of these 21x 22½-in. doors is a three-pole, 600-volt back-of-board carbon circuit breaker, operable by the lever on the door and tripped either automatically or by the button mentioned. A semaphore visible through a small window in the door indicates the switch position. At the sides and back of each breaker are ebony-asbestos barriers. On the inside of each door back of the louvers and opposite the arcing contacts is an asbestos baffle. The breakers, ranging from 90-200 amp. rating, control 440-volt, 25-cycle, three-phase feeders.

Among the major advantages of this Westinghouse construction are: Possibility of close spacing, symmetrical dead-front panel arrangement with provision for future breakers, ease of installing or changing breaker size without marring panel appearance and accessibility from back of board.





Not lockers, but a switchboard

Lever on door engages with toggle mechanism operating breaker. Hand-trip button merely projects through door and is not attached to it.

Feeder Boosters Add to Revenue

By O. VAN RYE
District Engineer
New England Power Engineering & Service Corporation, Providence, R. I.

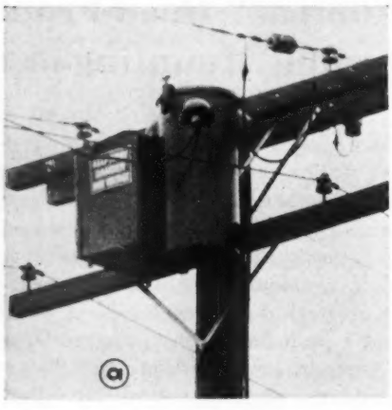
Higher density of ranges in rural (67 per thousand customers) than in metropolitan territory (10 ranges per 1,000) and generally greater progress in home and farm electrification have created a voltage regulation situation in Rhode Island which is being met by installing step-type transformer boosters. It is obviating the resort to "local feeders" and "feed-backs" and thus economizing on distribution investment. Voltage actuation of the boosters is found preferable to time-clock control and load-current control. Charts indicate that regulation is much improved over the results with the conventional type of induction feeder regulator, which can only boost the entire voltage level of the feeder. The boosters seldom operate more than four times per day.

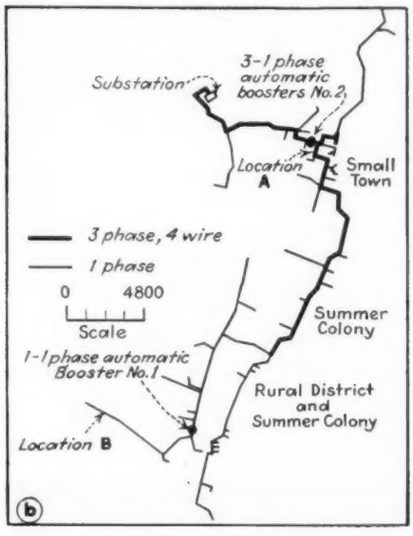
Cost is reduced because ten to fourteen automatic boosters of 10-kva. capacity can be installed for the cost of a bank of three 60-kva. substation regulators. The situation represented in the illustration involved a 400-kva. summer peak demand with considerable variety in load characteristics and distribution; the line is loaded lightly for the other eight months. The four single-phase automatic boosters cost a total of $1,600 installed complete with accessories. These, as well as several others on similar circuits, can be connected for either 5 or 10 per cent boost or buck.

A 5 per cent one-step boost was not found to be objectionable by the customer. Regardless of the smooth regulation of the primary voltage obtained by induction regulators, the combination of primary branch, transformer, secondary, service and house-wiring voltage drops tend to produce ragged regulation at the point of use.

These expenditures to improve voltage regulation were found justified by the resulting increase in revenue. One conclusive test involved a substation with six feeders serving combinations of domestic, small commercial and small power customers. A 10,000-kva. synchronous condenser was employed to vary bus voltage and the induction regulators were placed on non-automatic operation. Meters on the feeders showed that a 5 per cent increase in voltage resulted in a 6.89 per cent increase in load and a 1 per cent decrease in power factor. Calculations showed that increased losses accounted for 1 per cent of the added output. Laboratory tests meanwhile showed that the 5 per cent increase in voltage gave:

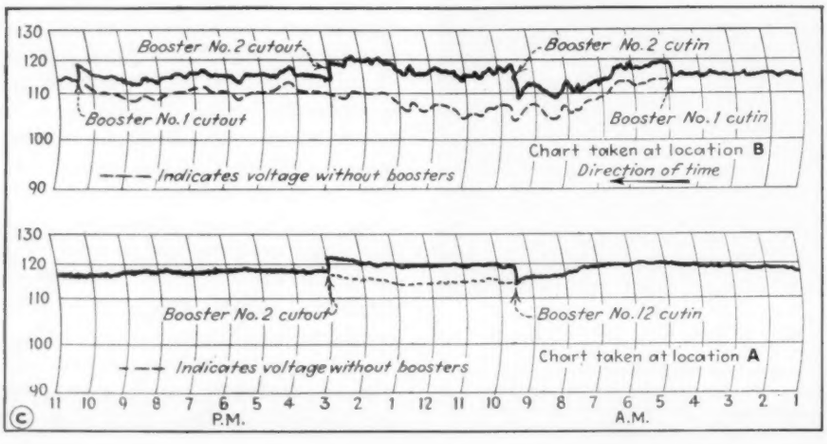
1. An 8.5 per cent decrease in time to bring water to boil on range plates.
2. A 3 per cent increase in consumption up to boiling point.
3. A 2.8 per cent increase in oven consumption at constant temperature.
4. Increases of 8, 4.3 and 1 per cent for three respective refrigerators.





Step boosters save investment and increase revenue

(a) Four General Electric step boosters installed.
(b) Feeder has diversified load, including fishing-village and lighthouse service.
(c) Steady voltage with infrequent operation of boosters.



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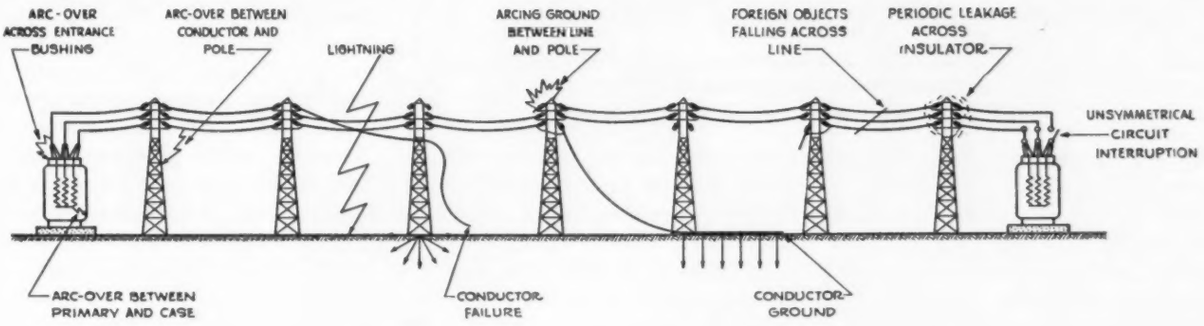
Tank Switch Controls Bearing Oil Pumps

By A. P. SCHNYDER
Electrical Engineer with George F. Hardy, Consulting Engineer, New York

Float switches in recent paper mill installations control the operating motors which drive the lubricating oil pumps for the driving gear and bearings of the paper machine driers;

MURRAY OUTDOOR DRY TYPE REACTORS LIMIT DAMAGE CAUSED BY



TRANSMISSION LINE FAILURES

Murray Low Loss Outdoor Dry Type Reactors are built in capacities up to 1000 amperes and 33 K.V. potentials.

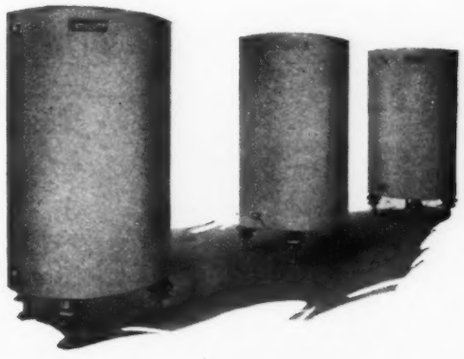
The insulated and enameled conductor is entirely sheltered within a concrete housing. The housing is moisture proof and still demountable if necessary.

Murray Low Loss Outdoor Dry Type Reactors incorporate all features of Indoor Dry Type Reactors—efficiency—ruggedness—reliability.

When in need of reactors protection send us your specifications.

Installations

City of Detroit
Northern States Power Co.
New England Pwr. & Constr. Co.
Firestone Tire & Rubber Co.
Long Island R.R. Co.
American Steel & Wire Co.
Pan American Petroleum Co.
Wired Radio Co.
Allis-Chalmers Mfg. Co.
Union Elec. Lt. & Pwr. Co., St. Louis
Westchester Lighting Co., N. Y.
Shawinigan Hydro Elec. Pwr. Co., Canada
French General Electric Co., France
Bronx Gas & Electric Co.
Carnegie Steel Co.
Turners Falls Power Co., Mass.
Utica Gas & Electric Co.
Youngstown Sheet & Tube Co.
Calgary Municipal Elec. Co.
Public Works Dept., N. Z.
Standard Oil Co. of N. J.
Vacuum Oil Co.
Calco Chemical Co.
Sydney Municipal Power Plant—New S. Wales
New Orleans Public Service Co.
Houston Power & Lighting Co.
Brooklyn Edison Co.
Chicago, Lake Shore & So. Bend R.R.
Consolidated Gas, Elec. Lt. & Pwr. Co., Baltimore
Illinois Steel Co.
Edison Electric Illuminating Co., Boston
Interborough Rapid Transit Co.
New York & Queens Elec. Lt. & Pwr. Co.
Public Service Electric Co. of N. J.
United Elec. Lt. & Pwr. Co. of N. Y.

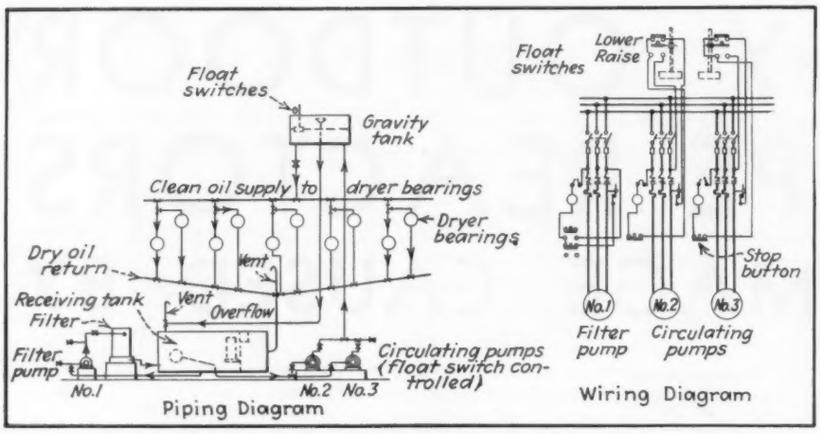


METROPOLITAN DEVICE CORPORATION
MURRAY PATENTS
BROOKLYN · NEW YORK

SINCE 1899

Installations

Hydro Elec. Pwr., Comm. of Ontario
Victoria Falls & Transvaal Power Co.
Havana Electric Light & Power Co.
Brooklyn Manhattan Transit Co.
New York Power & Light Corp.
Cataluna Power Co., Spain
National Tube Co.
Northwestern Electric Co., Portland, Ore.
City of Tacoma
Southern California Edison Co.
City of Seattle
Stone & Webster Properties
Allied Engineers, Inc.
Gary Heat, Light & Water Co.
Tenn. Coal Iron & R.R. Co.
New York Dock Co.
Merced Irrigation District
N. Y., N. H. & H. R.R. Co.
Potomac Electric Co.
Tennessee Power Co.
United Electric Lighting Co.
Union Gas & Electric Co., Cincinnati
Yonkers Electric Light & Power Co.
Dayton Power & Light Corp.
Commonwealth Edison Co.
Detroit Edison Co.
El Paso Power & R.R. Co.
Kings County Gas & Elec. Co., Brooklyn
New York Edison Co.
Philadelphia Electric Co.
Southern Wisconsin Power Co.
Kansas City Pwr. & Lt. Co.
Syracuse Lighting Co.
I.T.E. Circuit Breaker Co.
Columbus Ry., Pwr. & Lt. Co.
Packard Motor Car Co.
Public Service Co. of No. Ill.



Float switches control lubricating oil pumps

there are as many as 50 such driers on the high-speed type of machine.

The oil is continuously circulated from an overhead gravity tank to the bearing journals, thence to a filtration outfit from which the cleaned oil is pumped back to the gravity tank. Two sets of float switches in the tank are set normally to start only one of the two circulating pumps, but in case of unduly low level the switches will start both pumps. At a predetermined higher level the pumps are automatically shut down.

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Planning Rural Lines

By V. C. PRICE
Distribution Engineer,
Iowa Southern Utilities Company,
Centerville*

Before any rural line plan can be worked out an adequate map of the region must be provided. This map should show existing transmission and distribution lines with all information as to voltage, phasing, wire size, type of construction, etc. Peak loads should be noted for all communities served. Rural mail routes, primary and secondary highways, railroads, streams and obvious topographic features should appear on the map. And do not overlook the routes of pipe lines if any traverse the territory. On the map should be spotted all farmsteads with symbols indicating their classification as good, medium or poor, and whether owner or tenant occupied. Much of this latter information can be secured from insurance and real estate offices without field work. Available for use with the map, if not actually on it, should be associated data with reference to locations of quarries, resorts, radio stations, railway pumping plants not yet electrified and mines; in short, anything which could conceivably use electric service.

Location for trunk feeders is at once evident. Usually the costs of these trunk feeders must be shared by other system functions. The most important other possible function is service to small communities. Even the smallest villages are coming to demand service quality equal to that of large cities and to supply such service power must be available from at least two lines. It, therefore, follows that if a new line must be built from a major substation to a certain town to provide duplicate service, and if this line is routed such that it may also be a rural feeder, the cost may properly be split between transmission and rural line investment. No rules can be laid down as to the proper proportion to charge to each, but it is evident that considerable saving can be made in this manner.

*From paper to Missouri Valley Electric Association.

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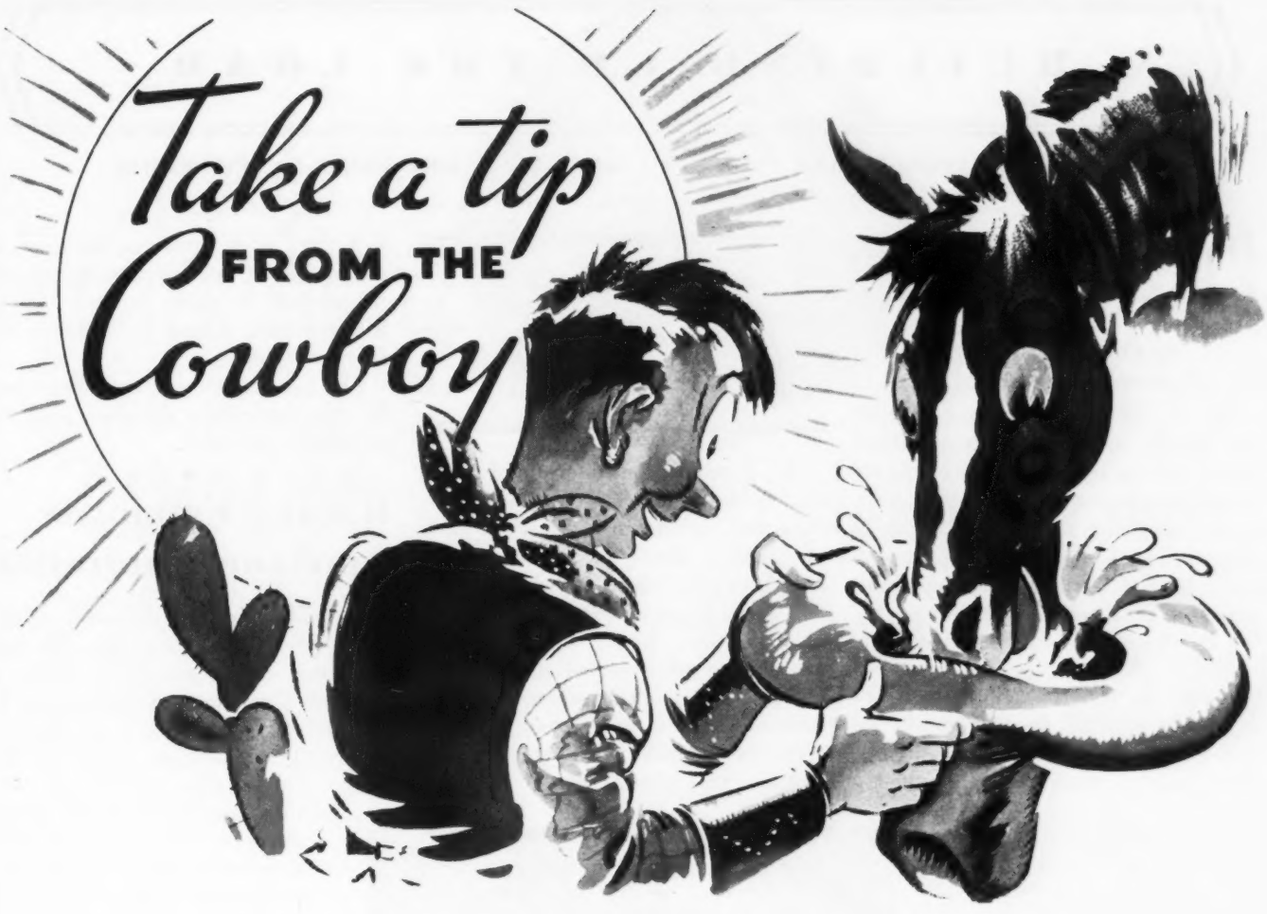
Photo-Electric Unit Regulates Lighting

A general level of illumination of about 20 foot-candles is constantly maintained in the Wallach Brothers' new Fifth Avenue store, New York, by means of photo-electric controls. Ceiling fixtures, each containing three 200-watt lamps, provide adequate light intensity, while prismatic plates distribute the light evenly throughout the store. The Westinghouse "Photolux" control units operate two lamps in each of these fixtures, turning them them off and on as lighting conditions require. The third lamp in each fixture burns constantly, since daylight never reaches sufficient intensity in the store to forego artificial light entirely.

As the amount of daylight entering the store increases during the day, the "electric eye" of the control notes the change and turns off one of the lamps in each fixture. As still less artificial light is required a second lamp is turned off automatically by the control. Toward the end of the day, as the amount of natural light wanes, the lamps are turned on again, maintaining the proper level of illumination.

Photolux control units inconspicuously recessed in walls and pillars of store



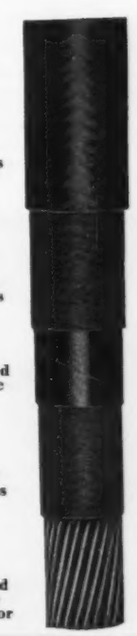
His "ten gallon" hat holds water in because it's ***felted.*** Asbestos as applied by Rockbestos holds water out because, like the cowboy's hat it, too, is ***felted.***

But that isn't enough. To gain the utmost moisture resistance the asbestos portion of the insulation of Rockbestos A.V.C. wires and cables is impregnated with moisture-resisting compounds especially developed for this purpose. Compounds and asbestos are one and inseparable—a dense, matted, moisture resistant insulation.

Do not confuse Rockbestos asbestos ***insulated*** wires with old-time asbestos braided wires or wires with so-called "slow-burning" coverings. Those coverings had no more moisture resistance than a braided straw hat and never should have been used in conduit. Rockbestos wire on the other hand, with its modern laminated A.V.C. insulation, ***was designed for conduit use*** and is suitable for any conduit condition short of complete submersion and we can even take care of that with a lead sheath over the A.V.C. insulation.

You can depend on the moisture resistance of Rockbestos A.V.C. wire just as confidently as you depend on its heatproof qualities and its permanence. It's the wire to use wherever circuits are exposed to heat, fumes, vapors, oil or grease or where a fire hazard exists.

If you are skeptical about its moisture resistance let us send you a sample length for test, also an interesting booklet telling about the development of this unusual wire and giving details of a severe moisture test which you may make on it. The handy coupon will bring both. Rockbestos Products Corporation, New Haven, Conn.



ROCKBESTOS

—the wire with permanent insulation

Please send me a sample of Rockbestos A.V.C. Wire and your booklet "The Bass and the Minnow."

Name .....

Company .....

City ..... State .....

Dark Rooms Cheered by Air-Shaft Floods

By CLIFTON E. SMITH
Consulting Engineer, New York

For an operating cost less than $5 per month certain apartments which drew low rental because they faced dark and gloomy air shafts have been given a startling suffusion of artificial daylight. A fourteen-story apartment house at 100 Central Park South was placed at the disposal of the author by the Bowery Savings Bank for experimentation and ultimate execution of a floodlighting installation. Such lighting was installed in two courts to give simulated sunlight for the apartments on the second to eighth floors.

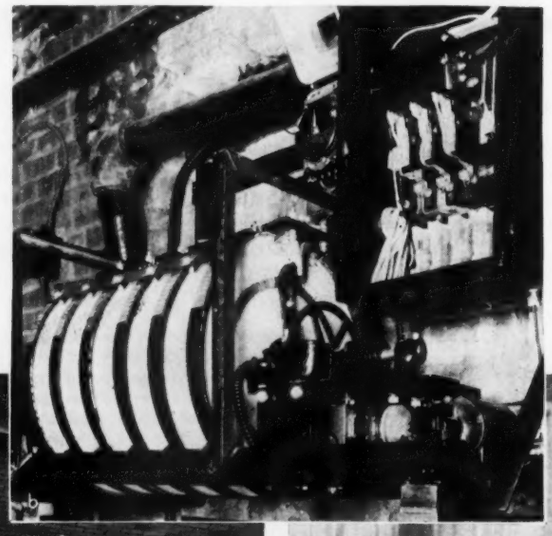
	Small Court	Large Court	Totals
Area (sq.ft.)	156	456	612
Cubage (cu.ft.)	12,012	35,112	47,124
Watts	6,000	12,000	18,000
Watts per cu.ft.	0.5	0.35	0.38
No. apts. affected	14	21	35
Installation cost	$800.00	$1,600.00	$2,400.00
Oper. cost (month)	54.00	108.00	162.00
Per month per apt.	3.86	5.15	4.63

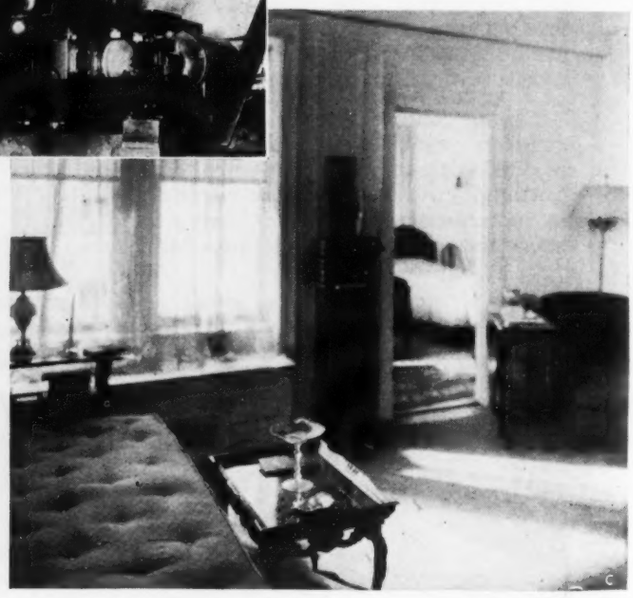
As a result the interior of these once underprivileged rooms now have light that streams in with all the glow of natural daylight. With shades half-drawn the beams are well diffused and there is no suspicion of an artificial source. Within the rooms the intensity is of sufficient quality and quantity to make reading possible without the aid of interior lighting even when outside apartments may be dim on dark, gloomy days.

A time clock turns the lights on at dawn and off at dusk, but the change in intensity is made gradual over a fifteen-minute period to eliminate the surprise element.

The installation and operating costs for the two courts are shown in the accompanying table.

(a) Standard G.E. 1,000-watt floodlights located in courts between fourth and ninth floors of fourteen-story building. Six in small area court and twelve in larger one. Each connected to separate branch circuit.
(b) Delay dimmer (Ward-Leonard) simulates sunrise and sunset. Actuated by G.E. synchronous motor time switch. Slow-motion gear reduction spreads energizing and de-energizing over 15-minute interval.
(c) Telephone operator says tenants call her to ask whether it looks like rain. It is always sunshine in their rooms.





Dim rooms in tall apartment house brightened by floodlights.

Raising Employee Appliance Saturation

Manufacturers of domestic appliances shed bitter tears over the fact that many utility people, including a generous percentage of higher-ups, do not use electric ranges, water heaters and refrigerators in their own homes. But the Northern States Power Company has done something about it. In spite of the fact that the company had an employee saturation on major appliances of 49 per cent it was able in a recent one month's campaign to raise the saturation to 79 per cent.

For the purpose of the campaign the employees were classified into six groups of "haves" and "don't haves." This is to say, that there were

I·E·S BETTER SIGHT LAMP MAKERS CAMPAIGN *speeds well lighted home*

I.E.S. Better Sight Lamps endorsed for lighting effectiveness by the Better Light-Better Sight Bureau

Forty of the leading portable lamp makers have united with Westinghouse Lamp Co. and the General Electric Co. in a new and greater campaign of education on the sight-saving lighting values of I. E. S. Better Sight Lamps. The significance of the I.E.S. Certification Tag and its importance to the public will be stressed.

The prime interest of this campaign to lighting service companies lies in the fact that it represents a concerted effort on the part of the entire industry to sell sight-saving lamps and to speed the arrival of the well lighted home.

Through the purchase of I. E. S. Better Sight Lamps, table, wall, or floor types, your customers will be made light conscious. Lamp wattage will have a new and greater load significance to the lighting company.

Conceived against a background of factual evidence which shows that it is vitally necessary to protect and conserve human eyesight by means of more abundant light for close visual tasks in the home, this campaign of education will do a tremendous selling job.

The story will be told in popular form in leading magazines this fall, commencing in September. Over 42,000,000 advertisements will tell the story of these lamps to millions of home folks in every section of the country.

This is reinforced by a continuous barrage of advertising and personal effort on the trade, which started June 1st. All branches of the lamp industry are telling the same I. E. S. Better Sight Lamp story.

Plans are complete. The movement has started. Is your company taking the active part that will result in increased load and greater good will—by displaying and advertising I. E. S. Better Sight Lamps and by cooperating with other local outlets that are, or should be, aggressively pushing the sale of these new and better lamps? Ask any of the following I. E. S. Better Sight Lamp Makers for more information—or get in touch with the General Electric Co., Nela Park, Cleveland, O., or the Westinghouse Lamp Co., New York, N. Y.

THESE MANUFACTURERS ARE HELPING TO DEVELOP CONSUMER SALES FOR YOU:

Aladdin Mfg. Co. . . Muncie, Ind.
Artistic Lamp Mfg. Company . . . . . New York, N. Y.
Almco-Art Lamp Corp. . Chicago, Ill.
Art Metal Company . . Cleveland, O.
Blue Valley Lamp Co., Kansas City, Mo.
Brown-Johnston Co., Spokane, Wash.
Buckley Studios, Inc. . Chicago, Ill.
Edward F. Caldwell & Company . . . . . New York, N. Y.
Calpa Products Co. . Philadelphia, Pa.
Colonial-Premier Co. . Chicago, Ill.
Cuyahoga Picture & Lamp Company . . . . . Cleveland, Ohio
Daison Mfg. Co. . Philadelphia, Pa.
Faries Mfg. Co. . . . Decatur, Ill.
Fashion Lamp Co. . . Chicago, Ill.
Frankelite Company . Cleveland, Ohio
Greenley Lamp & Shade Company . . . . . New York, N. Y.
Greist Mfg. Co. . New Haven, Conn.
Herco Art Mfg. Co. . Meriden, Conn.
Phil R. Hinkley . . Cleveland, O.
Jay-Willfred Co., Inc., New York, N. Y.
Lightolier Co. . . New York, N. Y.
Lumidor Mfg. Co., Alhambra, Calif.
Mantle Lamp Company of America . . . . . Chicago, Ill.
Markel Electric Products, Buffalo, N. Y.
Mazzolini Artcraft Co. . Cleveland, O.
Metallic Arts Corp. . . Chicago, Ill.
The Miller Co. . . Meriden, Conn.
Mitchell Mfg. Co. . . Chicago, Ill.
Mutual-Sunset Lamp Mfg. Co., Inc. . . . . New York, N. Y.
Wm. R. Noe & Sons, Inc. . . . . Brooklyn, N. Y.
Railley Corporation . Cleveland, O.
Rembrandt Lamp Corp., Chicago, Ill.
Rindsberger Mfg. Corp., Chicago, Ill.
Salem Brothers . . New York, N. Y.
Sandel Mfg. Co. . . . Chicago, Ill.
Standard Novelty & Lamp Company . . . . . Chicago, Ill.
T. A. Stiffel Co. . . . Chicago, Ill.
Venus Lamp Corp., New York, N. Y.
F. W. Wakefield Brass Company . . . . . Vermilion, Ohio
Ward Lamp Co. . . Cleveland, Ohio

I·E·S BETTER SIGHT LAMP MAKERS

groups of "haves" and "don't haves" with respect to refrigerators. The same employees could be reclassified into the two groups with respect to ranges, and again with respect to water heaters. One employee might thus be a refrigerator "have" and a range and water heater "don't have." All employees were given small replicas of the familiar Byllesby shield on which stars could be pasted, a red star signifying the possession of a refrigerator, a white one a range and a blue a water heater. Thus, a man who carried a blazon of less than the three stars was fairly a prospect to be worked on by any bearer of the star he did not have. But all this was pretty much scenery; the real kick in the campaign was a stock market.

Table of Sales Quotas and Accomplishments

	Quota	Sales
Ranges	400	831
Water heaters	300	622
Refrigerators	309	1,639
Total units	1,009	3,092

For every sale made by one employee to another the seller was given a share of stock with a par value of $4. The maintenance of that stock at par or its variation above or below was determined by the success that the particular division of the company had with its quota of sales. Stock increased or decreased in value by the percentage that the division went above or below its quota. Thus, during the period of the campaign stock values fluctuated. The stock of one division would take a sudden spurt, while that of another for some unaccountable reason would lag behind. At the central office and in all divisional offices daily stock quotations bid, asked and sold were chalked up on a blackboard and the trade in shares of stock was brisk indeed. If a man had faith in his own efforts and in his division he naturally bought all the particular stock he could get as well as working hard to earn shares as well.

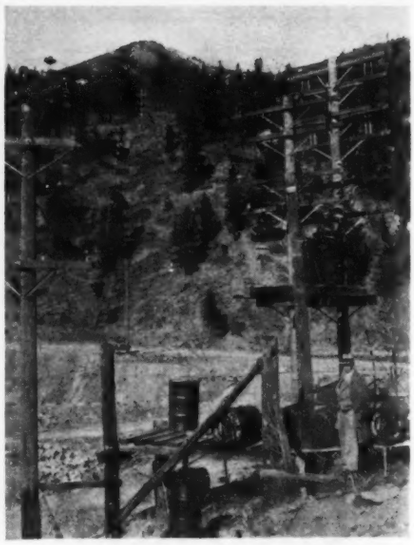
When the campaign was finished it was found that the original estimate of 1,000 sales units had been tripled and that the average share of stock was worth $12 instead of $4. The lowest stock value for any division was $8; the highest was around $30.

Service to Restored Gold Mines

By A. KANEKEBERG
Public Service Company of Colorado
Denver

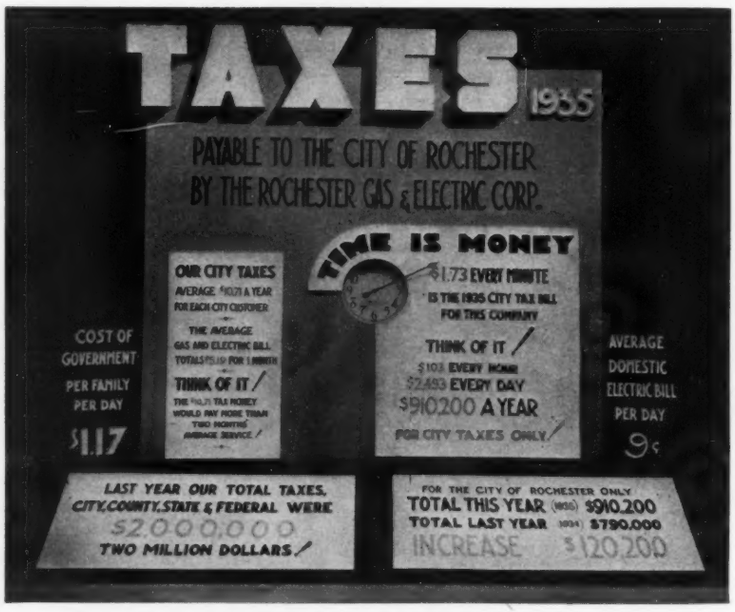
Lack both of ready cash and of knowledge as to ultimate power requirements on the part of the prospective customer creates a problem for the power company that is called upon for service to an old mine which, at the present price of gold, is expected by the optimistic promoter to get back into production. After being too trustful in the early days of the mining recrudescence, our company almost found itself in the mining business. Since then it has been the practice to require a deposit equal to two months' electric bill from a prospective customer.

Overhead line configurations and wire sizes for extensions are designed to meet the mechanical rather than the load requirements. Transformer installations are constructed of treated cedar poles, native timbers for platform, stranded crossarms, arresters and fused disconnects. The accompanying illustration shows an installation which has been found to be the lowest in cost consistent with safety, desirability and the indefinite power requirements of the customer. At the present time the Public Service Company of Colorado, Denver division, has many new customers at old mines in the mountains west of the city. The load connected in the last twelve months amounts to approximately 5,000 kw. In order to take on this load about 40 miles of new 11-, 13- and 22-kv. line have been built. The new line construction is not so large as it might have been if the system had not already been extended to serve most of the mountain towns.



Service at 10,000 ft.
This terminal of the 11-kv. extension to the Gold Dirt Mill is among the highest transformer installations on the continent.

To Tell the Tax Story


TAXES 1935
PAYABLE TO THE CITY OF ROCHESTER
BY THE ROCHESTER GAS & ELECTRIC CORP.
TIME IS MONEY
$1.73 EVERY MINUTE
IS THE 1935 CITY TAX BILL
FOR THIS COMMUNITY
THINK OF IT
$103 EVERY HOUR
$2,493 EVERY DAY
$910,200 A YEAR
FOR CITY TAXES ONLY
OUR CITY TAXES
THINK OF IT
COST OF GOVERNMENT PER FAMILY PER DAY
$1.17
AVERAGE DOMESTIC ELECTRIC BILL PER DAY
9¢
LAST YEAR OUR TOTAL TAXES, CITY, COUNTY, STATE & FEDERAL WERE
$2,000,000
TWO MILLION DOLLARS
FOR THE CITY OF ROCHESTER ONLY
TOTAL THIS YEAR (1935) $910,200
TOTAL LAST YEAR (1934) $790,000
INCREASE $120,200

Rochester Gas & Electric Company has featured a series of window displays in the windows of its central store. In each one something is moving to attract attention. Here is one of them. The extra large sweep hand on the clock caught the eye at once.

MEN OF THE INDUSTRY

Boston Edison Appoints New District Managers

John H. Kent has been appointed district manager of the Edison Electric Illuminating Company of Boston for the territory covering Needham, Dedham, Dover and Westwood and covering all phases of the company's business in that area. Mr. Kent has been in the company's service for 30 years, and until becoming local representative two years ago was installations foreman in the Needham section for seven years.

Thomas A. Stevens has been named manager for the Boston company in the Framingham district, including Natick, Holliston, Hopkinton, Ashland and Sherburn, in addition to the headquarters municipality. Mr. Stevens has been with the company since 1923.

Winslow E. Holmes, who has been connected with the Boston Edison company since 1910 in various capacities, has been made district manager of the area comprised of Walpole, Canton, Sharon, Medfield, Medway, Norfolk, Millis and Bellingham.

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▶ W. L. BLATT, president of the SKF Industries, Inc., Philadelphia, has received the nomination for president of the American Society of Mechanical Engineers for 1936.

▶ O. E. ROMIG, formerly metallurgist in the Gary sheet mill, American Sheet & Tin Plate Company, has been appointed manager of the electrical sheet division of the company at the general offices in Pittsburgh, Pa.

▶ CHARLES T. MAIN, dean of Boston consulting engineers, past-president of the American Society of Mechanical, of the Boston Society of Civil and American Institute of Consulting Engineers, has been made the recipient of the honorary degree of doctor of engineering by Northeastern University, Boston.

▶ STEWART N. CLARKSON and associates have established offices in New York under the name of Stewart N. Clarkson Associates, Inc., as specialists in trade relations between competitors. The purpose of the new organization is to render an intimate trade association service to manufacturers. Mr. Clarkson served as assistant to the managing director of the National Electrical Manufacturers Association from 1926-1930, and earlier in his career spent two years as Western editor of the ELECTRICAL WORLD. His activities have been devoted to merchandising, manufacturing and public utility branches of the electrical industry.

H. S. Vassar Heads Testing Materials Society

H. S. Vassar, laboratory engineer of the Public Service Electric & Gas Company at Irvington, N. J., has been chosen as president of the American Society for Testing Materials. Following graduation from Pratt Institute, Brooklyn, N. Y., in 1903, Mr. Vassar became associated with

H. S. Vassar

the engineering and operating departments of the Public Service Electric & Gas Company. Mr. Vassar has served on various committees of the A.S.T.M., is a member of the American Institute of Electrical Engineers and is active in the work of other organizations.

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▶ DONALD A. CROSSET has been appointed secretary-treasurer and general manager of the Alloy Metal Wire Company, Inc., Moore, Pa., in charge of plant production and sales activities. Mr. Crosset joined the Alloy Metal Wire organization at its inception in 1919, advancing to the office of secretary and engineering director, the position he held until his recent appointment.

▶ WILLIAM C. DANKS has been appointed a member of the Colorado Public Utilities Commission to succeed WORTH ALLEN, resigned. Mr. Danks was formerly Adjutant-General of Colorado and in recent years has been engaged in private law practice in Denver. Mr. Allen resigned to enter the practice of law after a service upon the commission extending over a period of eight years.

John G. Barry Retires; Other G.E. Changes

John G. Barry, senior vice-president of the General Electric Company, was elected an honorary vice-president at the meeting of the board June 28 and is retiring from active duty after more than 45 years of service. Mr. Barry will maintain an office in Schenectady and will be available for consultation.

Changes in the executive personnel of the apparatus engineering and sales organization of the company were also announced, effective July 1. Industrial commercial engineering will hereafter report to W. W. Miller, manager of the industrial department, and central station commercial engineering to M. O. Troy, manager of the central station department. Vice-President E. W. Allen will be a member of the apparatus sales committee and will have supervision of the contract service department and in addition will assist the district offices in all phases of their work.

Vice-President E. O. Shreve will continue as executive representative of the company in the National Electrical Manufacturers Association, and is appointed chairman of the apparatus sales committee, which will direct the general commercial policies of the apparatus departments of the company.

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▶ A. D. BAILEY, superintendent of generating stations of the Commonwealth Edison Company, Chicago, Ill., has received the nomination for a vice-presidency in the American Society of Mechanical Engineers.

▶ DR. C. B. AIKEN, of the Bell Telephone Laboratories, New York, has been appointed associate professor of electrical engineering, in charge of the department of communication engineering at Purdue University, Lafayette, Ind. For the past seven years he has been engaged in radio development work at the Bell Laboratories. Since the death of Professor Morecroft, Dr. Aiken has been teaching his courses in electronics at Columbia University.

▶ OSCAR P. CLEAVER, formerly district engineer of the Westinghouse Lamp Company with headquarters in Chicago, has been transferred to the commercial engineering department in Bloomfield, N. J., where he will be placed in charge of lighting promotion activities for the company. WESLEY T. HARRISON has

been transferred from Bloomfield to Chicago to fill the position of district engineer left vacant by Mr. Clever's promotion.

▶ C. F. MYERS, formerly identified with the Puget Sound Power & Light Company at Wenatchee, Wash., is now distribution engineer at Everett, Wash.

▶ JAMES H. GRAHAM, consulting engineer, has been appointed dean of the college of engineering of the University of Kentucky, Louisville.

▶ P. K. MOFFATT, who has been with the Cia. Cubana d'Electricidad, Havana, Cuba, is now with the Potomac Electric Power Company, Washington, D. C., as cable engineer.

▶ L. F. GRIFFITH, formerly engineer in the distribution department of the Shanghai Power Company, Shanghai, China, is now employed as an engineer by the U. S. Government at Washington, D. C.

▶ HOWARD E. ROSS, who has been connected with the illuminating engineering section of the Pennsylvania Electric Company, Somerset district, since 1929, has been assigned to full-time duty on street and highway lighting for the Indiana, Johnstown and Somerset districts.

▶ LLOYD A. GATES, for several years illuminating engineer with the incandescent lamp division of the General Electric Company at Los Angeles, Cal., has taken a similar position with the Graybar Electric Company at Los Angeles.

▶ STANLEY J. MCGIVERAN, for several years sales manager of the prescription ware division, Owens-Illinois Glass Company, has been promoted to the position of manager of sales merchandising. Mr. McGiveran will correlate the activities of the advertising department, the agency and the sales executives on related problems.

▶ J. E. BORLAND, general engineer with the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., is now with the Westinghouse Electric Company of South Africa, Ltd., at Johannesburg. Mr. Borland has been a member of the A.I.E.E. committee on applications to mining work since 1933.

▶ GEORGE M. RICHARDSON, formerly purchase engineer of the Southern California Edison Company and past-president of the National Association of Purchasing Agents, has joined the Phelps Dodge Copper Products Corporation as district representative in the Pacific Northwest, covering Washington, Oregon, western Montana and a portion of Idaho. His headquarters will be with the Graybar Electric Company, Seattle, which is exclusive agent for Phelps Dodge products on the Pacific Coast. Mr. Richardson has been active in the Pacific Coast Electrical Association.

▶ W. A. BARNES, who has been chief engineer of the Swartzbaugh Manufacturing Company, Toledo, Ohio, has been made chief engineer of the Dominion Electrical Manufacturing Company, now located at Mansfield, Ohio.

▶ JOHN R. TILLMAN, formerly head of the tool engineering department of the Bullard Company, Bridgeport, Conn., has recently been appointed assistant to Dudley B. Bullard, vice-president in charge of engineering. In his new capacity Mr. Tillman will combine the supervision of all departments of engineering of the Bullard Company.

▶ A. B. HATCH, formerly sales manager in Chicago of the Hurley Machine Company, has returned to the company as eastern sales manager with headquarters in New York. In the past few years Mr. Hatch has been New England division manager of the Premier Vacuum Cleaner Company and more recently has been with the public utilities division of the Frigidaire Corporation, New York.

▶ JACK G. HOLTZCLAW, president of the Virginia Electric & Power Company, Richmond, has been named chairman of the public utilities committee of the Virginia State Chamber of Commerce in that organization's campaign to raise a "war chest" of $125,000 in memberships to be used chiefly for out-of-Virginia publicity and research toward the solution of many of Virginia's most immediate problems.

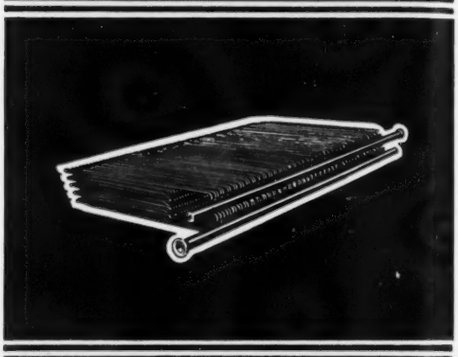
▶ LEONARD F. PARTRIDGE, formerly manager of the Andover, Mass., office of the Lawrence Gas & Electric Company, has resigned to establish the Andover Appliance Company with headquarters in Andover.

▶ W. W. SPANGLER has been appointed credit manager Westinghouse Electric & Manufacturing Company, with headquarters in East Pittsburgh. Mr. Spangler has been associated with Westinghouse since 1916.

▶ J. MARSHALL FRYE, who has been associated with the North State Creosoting Company, will continue as manager of the branch plant at Wilmington, N. C., following the acquisition of the North State properties in that city by the Taylor-Colquitt Company, Spartanburg, S. C.

▶ K. I. CLISBY, who has represented the Ohio Electric Manufacturing Company in New York since 1920, has been elected a vice-president of that company. Mr. Clisby started in sales engineering in 1919 and besides handling the Ohio line of lifting magnets and fractional-horsepower motors in his territory, which

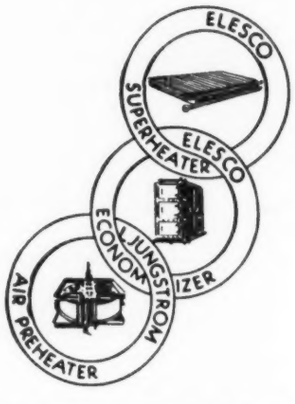
Better



STEAM

Elesco superheaters are in successful operation under the most extreme conditions, providing the highest degrees of superheat in commercial use. High steam velocities in the multiple-loop, single-pass units assure equalized steam distribution and low metal temperatures; therefore long life and minimum outage for repairs.

Elescoordinated basic principles give better steam.



ELESCOORDINATED

THE SUPERHEATER COMPANY
THE AIR PREHEATER CORP.
60 East 42nd St. . . New York

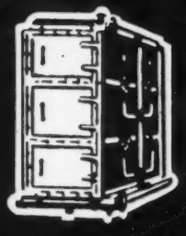
SUPERHEATERS · AIR PREHEATE

The ultimate aim of all industry .. science .. government and sociology is for a better life . . better living conditions .. better health .. better food .. better government .. better houses .. in fact .. better everything

CHARLES F. KETTERING
Vice Pres. in Charge of Research
GENERAL MOTORS CORPORATION

• • •

Better



WATER

Elesco fin-tube economizers, being of compact design, frequently can be installed in what is considered waste space in the boiler room. Efficient design of the heating surface permits high gas and water velocities with maximum heat transfer accompanied by minimum draft losses.

Elescoordinated basic principles give better water.

Better

AIR

Ljungstrom air preheaters, operating on the regenerative principle, have slowly revolving heating surface, every portion thoroughly swept by both the gas and air. Thus flue gases are reduced to extremely low temperatures without danger of deteriorating the heating plates.

Elescoordinated basic principles give better air.

GRIFFIN HOT BLAST · WATER WALLS · ECONOMIZERS

A-556

Reduce Costs This Way!

- *on Rural Electrification*
- *on Parkway Construction*

Lay your cables with the powerful, rugged Pemco Plow—and reduce rural electrification costs—do away with costly pole line construction—*eliminate expensive trenching and backfilling.*

The Pemco Cable Laying Plow will lay a single cable up to 1¼" dia. or two 1" cables, to a depth of 16" to 20", in a single, fast, low cost operation.

Pulled by a tractor, or truck with a winch, or portable winch. Equally effective in sand, clay or shale rock. Can be operated by a crew of four men. Used by many utility and telephone companies. *One operating utility saved $15,000.00 on a single job.*

Write for complete information and prices.

PEMCO CABLE LAYING PLOW

PHILADELPHIA ELECTRICAL & MANUFACTURING CO.

1222-36 No. 31st Street
PHILADELPHIA, PA.

comprises eastern New York, Connecticut, western Massachusetts and northern New Jersey, he has represented a number of other electrical manufacturers.

► J. W. BARNETT, formerly director of the division of construction and finance of the U. S. Shipping Board, has joined the Babcock & Wilcox Company's marine department.

►JOHN J. CROWE, engineer in charge of apparatus research and development for the Air Reduction Company with laboratories located in Jersey City, was elected president of the American Welding Society at the recent annual meeting held in New York.

► H. W. NEWELL, who for the past three and a half years has been vice-president in charge of sales of the Frigidaire Corporation, has resigned to become vice-president of Geyer-Cornell Company, advertising agency with headquarters in New York.

► C. H. GUY has been appointed utility supervisor of the refrigeration department of the Westinghouse Electric & Manufacturing Company with headquarters at Mansfield, Ohio. Mr. Guy's responsibilities will be the promotion and development of refrigeration business through public utilities throughout the United States. He has had several years' experience in sales work for electric appliances and, in addition, has had considerable success in public utility contact work on electric refrigeration. Previous to his work with public utility interests Mr. Guy held several responsible positions building sales organizations in Pittsburgh and Boston for electrical merchandising.

OBITUARY

Sergius P. Grace

Sergius P. Grace, assistant vice-president of the Bell Telephone Laboratories, Inc., since 1928, committed suicide June 23 at his home in Rye, N. Y. Mr. Grace, who was 59 years old, had returned only recently from the South, where he had been in poor health. After devoting his life to invention of sound-conveying devices, Mr. Grace became prominent in 1926 when he was elected president of the New York Electrical Society, which he converted into a great science forum.

Born in Farmington, Mich., Mr. Grace, following graduation from the University of Michigan, became identified with the Detroit Telephone Company and later with the People's Independent Telephone Company of New Orleans. In 1902 he joined the general engineering staff of

AWAY FROM THE HEAT AND HURRY OF THE CITY

Well-known to the city dweller is the recurrent longing for green fields and growing things. For the peace and comfort of a house by the side of a quiet road. Where the children may find greater health and safety. Where the air is fresh and clean and tall trees shade the day. The telephone has helped to make that dream come true for countless men and women.

Long miles may separate your office from your home, yet you are never far away. It takes but a moment for you to call your wife or child. And they have but to lift the receiver to be in touch with you, with friendly neighbors, with guardians of their welfare.

Telephone service like this is the result of years of co-ordinated effort by the Bell System. Bell Telephone Laboratories contribute their research and engineering. Western Electric its manufacturing, purchasing and distributing. The twenty-four regional telephone companies, with the assistance of the American Telephone and Telegraph Company, see to it that the latest improvements in the art are made available to all.

Because of this unified plan, today's telephone service brings families closer — friends nearer. It makes homes safer — life fuller.

BELL TELEPHONE SYSTEM

SINGLE UNIT TYPE "EKO-T"

- All Hi-Pressure Contacts . . . an original R. & I. E. feature.
- Few parts. Doors and contact castings—heavy, simple design—interchangeable between single and double.
- Write for the new information on R. & I. E. Knockout Fuses.

● Here's two cut-out fuses in one. When a fault occurs, the first fuse blows, interrupting the circuit and releasing the door. As the door drops out, it releases a plunger contact (actuated by an enclosed coil spring) which makes contact with the second unit. In many cases this operation restores service—but, if the fault still exists, the second fuse will blow, opening the second door. To refuse and reset—remove doors, replace fuse elements, reset plunger contact by pulling plunger handle back to original position.

RAILWAY AND INDUSTRIAL ENGINEERING CO.
GREENSBURG . . . PENNSYLVANIA

R&IE
Enclosed Cutout Fuses

the American Telephone & Telegraph Company, with headquarters in Boston, and in succeeding years occupied other important engineering positions in various Bell companies. From 1913 he was chief telephone engineer of the New York Public Service Commission and the next five years he spent with the New York Telephone Company. In 1924 Mr. Grace joined the laboratory unit of the Bell system and in 1928 was appointed assistant vice-president. There many of the marvels of science were developed, some of them under his supervision. He invented numerous technical improvements. He was a fellow of the American Institute of Electrical Engineers.

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Frank Espy

Frank Espy, vice-president of the American Gas & Electric Company and vice-president and executive director of its subsidiary, the Ohio Power Company, died at Canton June 20, in his fifty-eighth year.

Mr. Espy had been connected with the American Gas organization since 1909, the year in which negotiations were started for the acquisition of the Tiffin, Ohio, properties. In that same year he

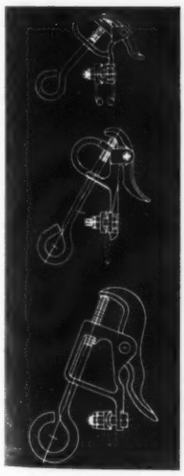
Frank Espy

was transferred to the Citizens Light, Heat & Power Company at Altoona, Pa., but early in 1910 he returned to Tiffin as manager of the company, which the American Gas & Electric Company had succeeded in acquiring. Subsequently he joined the Ohio Power Company at Newark and in 1917 came to New York to become assistant to George N. Tidd, at that time vice-president and general manager of the company. After a short connection with the Atlantic City properties he returned to the Ohio Power Company as general manager, with headquarters in Canton.

Mr. Espy's thorough understanding of all operating problems, garnered from his long experience with the various properties, qualified him for broader executive duties and in 1923 he was named vice-president of the American Gas & Electric Company, in charge of plants and organizations of the company's subsidiaries.

LIVE LINE CLAMPS

● **The R. & I. E. Live Line Clamp is simple, positive and rugged. It has a carrying capacity of over two times the largest size wire on which it can be used. It is so constructed that it can be clamped to either wire, flat bar or structural steel members.**



Ideal for Sectionalizing, Grounding, Tap-offs, Testing, Lightning Arrester connections, in fact, any use where a hot line is to be tapped, or where quick connections are to be made.

●

RAILWAY AND INDUSTRIAL ENGINEERING CO.
GREENSBURG, PA.

R&IE

► CHARLES P. DICKINSON, one of the pioneers in the development of hydro-electric power in New York State, died June 12 in Boston, Mass., in his eighty-second year. Mr. Dickinson built four dams and power plants on the Roundabout River in the Catskill Mountains and organized the Honk Falls Power Company, which supplied power to Kingston, Newburgh and Poughkeepsie, N. Y. After 24 years of exclusive ownership, he sold the company to the Central Hudson Gas & Electric Company in 1920. In recent years Mr. Dickinson became associated with Igor Sikorsky, aeronautical inventor and engineer, and was instrumental in forming the Sikorsky Airplane Company at Roosevelt Field, Long Island.

► HUGO ROCKTASHEL, general sales manager of the New England Power Association and one of the best-known industrial power engineers in the East, died suddenly in Boston, Mass., June 20 from a heart attack. In the fall of 1909 Mr. Rocktashel entered the service of the Connecticut River Transmission Company, predecessor of the New England Power Company system, making his headquarters at Fitchburg. Three years later he became assistant superintendent of distribution and won steady promotion in connection with power sales, with headquarters at Worcester and then at Boston, until in 1926 he attained the position he held at the time of his death. He was long active in the New England Association of Central Station Power Engineers. Mr. Rocktashel was 44 years old.

► WALTER F. BACHELDER, secretary and general sales manager of the wire manufacturing establishment of George W. Prentiss & Company, Holyoke, Mass., died at his home in that city May 23.

► COL. LEWIS W. CALL, formerly chief counsel of the Federal Power Commission, died in Washington, D.C., June 26. Prior to and after his service with the Federal Power Commission Colonel Call served in the office of the Judge Advocate-General of the army.

► BASIL LANPHIER, senior electrical engineer on the staff of American Gas & Electric Company, died recently following an emergency operation. Following graduation from the Massachusetts Institute of Technology in 1916 he spent several years with the Bethlehem Steel Company at Lebanon, Pa., and in 1918 joined the engineering staff of the I.R.T. in New York City. In 1922 Mr. Lanphier joined the Duquesne Light Company and in 1923 he began the association with American Gas & Electric Company. As a member of the A.I.E.E. he contributed a number of engineering papers and was prominent in the activities of the institute's technical committees.

OPEN THESE DOORS!

● If you are interested in getting better results in your drafting room—at lower cost—here is a book you ought to have. It tells you how to save 25% to 40% of drafting time . . . how to eliminate the expense of ink tracing by making good reproductions directly from pencil tracings . . . how to get rid of discoloration and brittleness in vellum tracing papers. It describes money-saving "short-cuts" in altering tracings . . . shows how to make positive, black-line prints *even faster* than blue prints.

All in all, this new book opens up ten separate doors to progress for YOU. A copy is yours for the asking. Mail the coupon for it—today.

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SINCE 1899

SENSITIZED PAPERS . . . REPRODUCTION PROCESSES . . . DRAFTING ROOM EQUIPMENT . . . DRAWING MATERIAL

NEW YORK CHICAGO DETROIT BOSTON
NEWARK ST. LOUIS PITTSBURGH
LOS ANGELES SAN FRANCISCO MILWAUKEE

Uniformly good commutation is the mark toward which intelligent brush application is aimed.

SA25 · SA30 · SA35 · SA40 · SA45

GRADED COMMUTATING CHARACTERISTICS
UNIFORM PHYSICAL PROPERTIES · UNIFORM PERFORMANCE

The outstanding performance of "SA" Series Brushes on heavy duty D.C. service is the result of

NEW COMBINATIONS OF MATERIALS · NEW METHODS OF MANUFACTURE
NEW STANDARDS OF CONTROL

The grades of the "SA" Series cover operating conditions on all types of heavy duty D. C. machines in both industrial and power plant service.

Use "SA" Series Brushes on your heavy duty D.C. equipment.

NATIONAL CARBON COMPANY, INC.
Carbon Sales Division, Cleveland, Ohio
Unit of Union Carbide UCC and Carbon Corporation
Branch Sales Offices: New York • Pittsburgh • Chicago • San Francisco

Recent Rate Changes

Florida Power Corporation's new rate schedule went into effect in nine Florida communities July 1. The new rates are: One dollar minimum charge, which allows the use of 10 kw.-hr. per month; 9 cents per kilowatt-hour for the next 15 kw.-hr. used per month; 6 cents per kilowatt-hour for the next 50 kw.-hr. used per month; 3 cents per kilowatt-hour for all in excess of 75 kw.-hr. per month.

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Negotiations were completed recently between the New Jersey Power & Light Company and the state Board of Public Utilities Commissioners resulting in an adjustment of rates it is estimated will effect a saving to consumers of $126,100 annually. The rate took effect July 1.

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New York State Public Service Commission has advised the Utica Gas & Electric Company that if it will file the so-called "inducement plan" for the modification of its electric rates for residential service in all of its territory, except the rural portions, the commission will permit the rates to become effective upon the usual statutory notice without approval or disapproval. The plan proposed by the Utica company is similar in every respect to one proposed by the Syracuse Lighting Company which is being considered in a proceeding concerning the rates of that company. The Utica company asked for approval of the plan before filing the schedules. The plan provides for a determination of the amount of service used by each residential consumer during the year preceding the effective date of this plan, such use being taken as the consumer's base consumption and for the crediting to each consumer of a portion of any subsequent use of service by him in excess of his base consumption, the resulting net use being billed at the schedule rates. The practical application of the plan is that the consumer receives 25 per cent reduction over the schedule rates on all consumption above the base bill.

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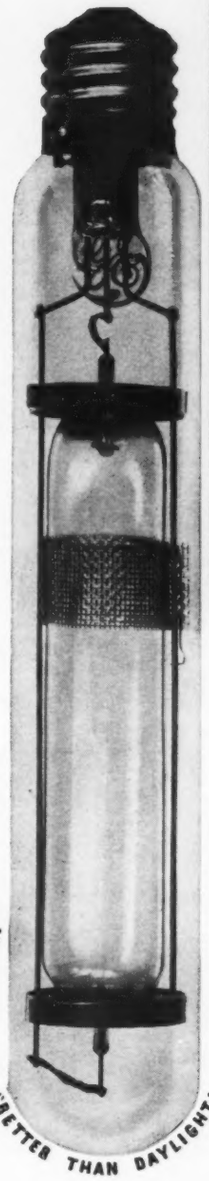
Puget Sound Power & Light Company lost the decision in a preliminary court test of the validity of a 1933 legislative act authorizing the Washington department of Public Works to assess the cost of its state-wide power, water and gas rate investigation against the utilities. Ruling on a suit brought by the department to recover costs of investigations from the Puget Sound Power & Light Company and other utilities, Judge John M. Wilson of Thurston County superior court, held the 1933 law to be constitutional in all respects. Other utilities involved are the Northwestern Electric Company, Interstate Power & Light Company, Winlock Water Company, Inc., Oregon-Washington Telephone Company.

Philco USES BETTER LIGHT AS A "PRODUCTION TOOL"

These G. E. High Intensity Mercury Vapor Lamps are suspended 9 feet above the floor in a combination layout. Every other outlet is equipped with 300 watt incandescent lamps. The penetrating white-light sensation produced makes seeing easy. Even minute details stand out in bold relief.



HIGH INTENSITY MERCURY VAPOR LAMP

Even the few shadows are luminous in the coil winding department at the plant of the Philadelphia Storage Battery Company. G. E. High Intensity Mercury Vapor Lamps make light work of the finest detail, enabling workers to see quickly and without eye-strain even the hair-fine enameled wire which they wind. This better light means better sight . . . and better, more economical production.

The daylight sensation produced by these G. E. High Intensity Mercury Vapor Lamps is pictured above. Note how free from costly shadows every work table is. The light penetrates into recesses. Even the floor is well-lighted. Halation is absent — objects are seen in their true perspective.

Insure your plant against spoilage chargeable to inadequate light. By installing this new "production tool" you automatically insure more uniform production. The complete details can be had by writing to . . . General Electric Vapor Lamp Company, 805 Adams Street, Hoboken, New Jersey.

GENERAL ELECTRIC VAPOR LAMP COMPANY

643 Copr. 1934, General Electric Vapor Lamp Co.

NEW EQUIPMENT

Induction Regulator

Type SS.; maximum rating 24 kva. **Westinghouse Electric & Manufacturing Co.,** East Pittsburgh

Ruggedness and simplicity are featured in the design of this regulator to permit economic application to low-capacity, low-revenue circuits. An electrical position indicator on the control panel indicates the regulator position. A compensator type primary relay offers both resistance and reactance in drop compensation. This device has a fixed ratio of resistance and reactance compensation, but the total amount of compensation may be readily adjusted within the usual range.

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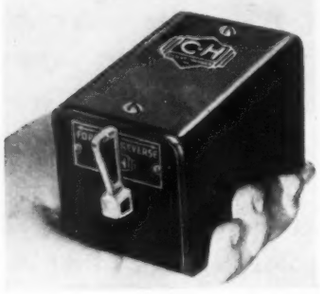
Small Drum Switch

Simplicity of mechanism and high capacity rating are featured in these drum-type, across-the-line reversing switches. Equipped



Ratings: Single phase, 1 hp. 110 volts, 1½ hp. 220 volts; polyphase, 1½ hp. 110 volts, 2 hp. 220, 440 or 550 volts; direct current, 1 hp. 115 or 230 volts. **Cutler-Hammer,** Milwaukee, Wis.

with twin-break contacts and molded arc barriers, they are applicable to almost any type single-phase, polyphase or d.c. motor. It can also be used as a three-pole, double-throw switch by removing jumpers.

•

Current-Testing Set

Current transformer capacity 25 amp.; ammeter has both 12.5- and 25-amp. scales. **General Electric Company,** Schenectady, N. Y.

Consisting primarily of an ammeter and a current transformer in a portable case, this set was developed as a reliable current-checking device to assist in maintaining rated light output and rated life of lamps in series-lighting circuits. It is intended for use on automatically operated constant-current transformer circuits where an ammeter is not reliable, such as is ordinarily the case on a manually operated circuit.

•

Battery-Operated Flashers

Reynolds Electric Company, Chicago, Ill.

Used on small signs and displays, these "Thermo Flashers" operate on direct current. Handle 25 to 100 watts; the 6-volt size carries up to 5 amp. Designated as RECO No. 4,100.

•

Clamps for Wire Shields

These easily installed clamps, used for holding protective shields around overhead wires subject to abrasion from trees, consist of a rack-grooved tongue and pivoted worm

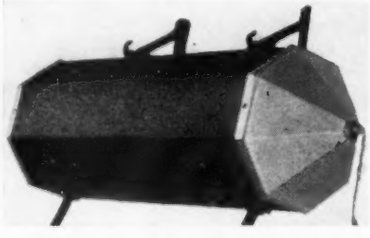
Available in five sizes from ⅜ to 3½ in.; either "Everdur" metal or electrogalvanized steel. **Otto Bieber,** New York

screw. The tongue of the clamp when slid under the worm screw locks in place until the clamp can be tightened with a screwdriver. When this is done the tongue is drawn up circumferentially, holding the shield firmly in place.

•

Luminous-Tube Transformers

Pleasing appearance of these units permits installation in a window or throughout a business establishment without excusing or hiding them behind valances. Removable secondary leads of strong high-voltage cable



"Windoette." **Acme Electric & Manufacturing Co.,** Cleveland, Ohio.

will support safely a skeleton type neon sign weighing up to 100 lb. Full range of sizes available.

Rural Line Transformer

Provided with removable stud-type bushings, lightning protective gaps on both primary and secondary and grounding stud for high-voltage neutral, these transformers are designed for use on rural distribution lines using the three-phase, four-wire Y system with grounded neutral. The transformers are single-phase and are connected between one high-voltage phase wire and the grounded neutral.

Sizes: 1 and 3 kva. Voltages: Primary, 2,400, 4,800, 7,200, 7,620; secondary, 120/240. **Kuhlman Electric Co.,** Bay City, Mich.

•

Generator Voltage Regulator

This voltage adjuster regulates output voltage of small constant-speed generators by correcting their field excitation with changes in voltage. A solenoid-type, movable-core, voltage-sensitive element directly operates a quick-acting resistance pile rheostat through a system of levers. Connected in the exciter field circuit, this

Type G4; panel mounting; used with small one-, two- or three-phase, 25-125-cycle, a.c. or d.c. generators having individual self-excited exciters. **General Electric Company,** Schenectady, N. Y.

rheostat changes the generator field excitation as voltage changes occur. Pressure applied to the outer edge of the pile-type rheostat tilts the stack forward, rocking the plates of the pile so their edges come together one at a time, changing resistance.

That Bit of Porcelain Stops Meter Tampering

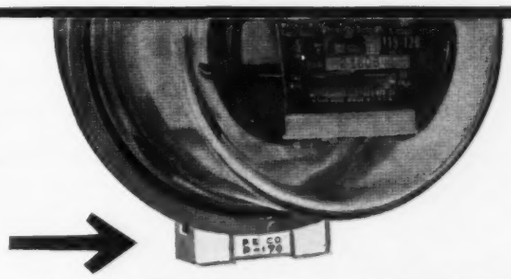
Immediately, Positively, Permanently

Type CS meters are being adopted by operating utilities for several good reasons—one being the fact that this meter, of any manufacture, can be effectively sealed, for a few cents, with the Star Meter Seal.

Toledo Edison, Cal.-Oregon Power, Porto Rico Electric, Philippine Electric, Modesto Irrigation Dist. and others are using Star Seals on CS meters. Westinghouse Electric recommends them. Westinghouse International handles them for export.

Let us tell you more about them and quote prices.

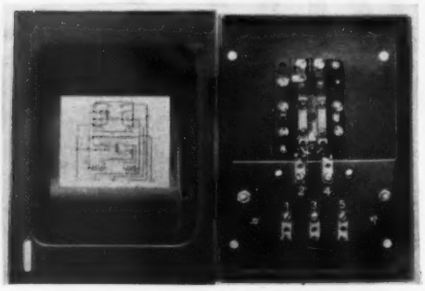
STAR PORCELAIN COMPANY
TRENTON, N. J.



★ **The Star Seal is a simple piece of glazed porcelain, snapped onto the bottom of the meter cover ring with two metal clips. Once in place it cannot be removed intact—it must be destroyed to open the meter. Prevents tampering and current diversion. Protects meters. Saves money—lots of money. Send for sample.**

New Timing Relay

Use of a calibrated thermal relay, with a delay of a few seconds to several minutes, to operate a mechanical contactor makes this timing device suitable for sequence starting



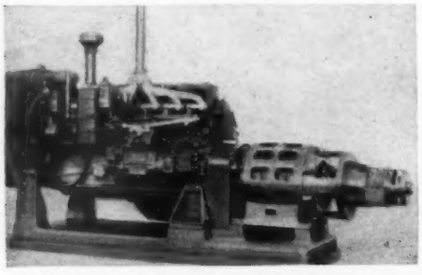
Thermal relay type R-4 (a.c. or d.c.) and magnetic contactor in standard switch box; has spare contacts for multiple circuit use. **Thomas A. Edison, Inc.**, West Orange, N. J.

of motors and compressors. Inrush currents and demand loads are reduced with this relay by calibrating to allow 20 to 30 seconds between starting of each unit. Controlling relay is sealed in dust-tight, evacuated glass tube, insuring clean contacts.

•

Diesel Generator Set

Used for supplying service to mines, quarries, construction camps, etc., this set comprises a generator directly connected to a Diesel engine through a link coupling. The



Capacities from 35 to 60 kw., a.c. and d.c. **Harnischfeger Corporation**, Milwaukee, Wis. (generator unit). **Caterpillar Tractor Company**, Peoria, Ill. (Diesel engine)

whole arrangement is mounted on a substantial cast-iron base. Standard units will be provided with all auxiliaries, radiator cooling system, starting engine, fuel pump and engine controls for speed setting and close governing.

•

All-Electric Typewriter

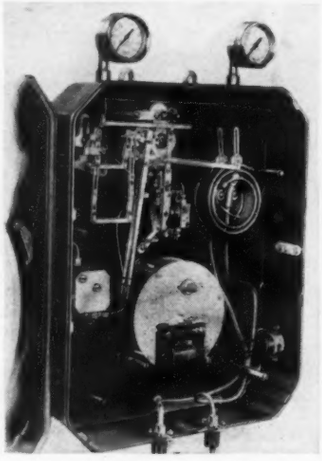
All typing operations can be performed without removing the hands from the keyboard of this new all-electric machine. Typing, spacing, shifting, backspacing, returning the carriage, line spacing, tabulating, setting and clearing tabular stops and reversing or shifting the ribbon are done electrically, without noise. There is no possibility for one "touch" to be different from another as a graduated scale allows any degree of impression to be selected.

Electromatic typewriter. **International Business Machine Corp.**, Endicott, N. Y.

•

Reset Controller

For controlling temperature, pressure, rate of flow or liquid level in a predetermined relation to some other condition, this instrument is used where a fixed differential must



Face or flush mountings obtainable. **Taylor Instrument Company**, Rochester, N. Y.

be maintained between two variables one of which is under control. The maximum ratio obtainable with the controller is 5 to 1. Both direct and inverse ratio adjustments are obtainable. Control is maintained by regulating the flow of air pressure to a diaphragm valve in the controlling medium line.

•

Small High-Speed Grinder

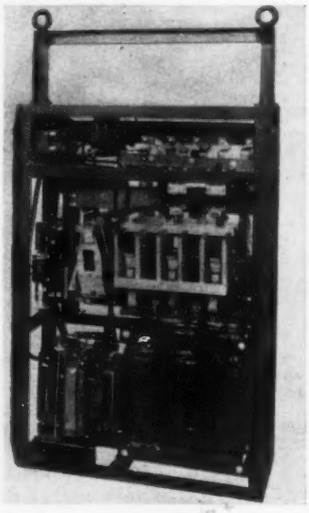
Used for cleaning, grinding, polishing, sanding, cutting, carving and engraving, this tool features a compact design, high speed and power. It is equipped with high-

Dimensions, 6 in. long and 1¼ in. diameter; weight, 15 oz.; speed, 25,000 r.p.m. idle, 18,000 r.p.m. working; motor, universal, 110 volts a.c. or d.c. **Chicago Wheel & Manufacturing Co.**, Chicago, Ill.

speed precision ball bearings housed in end caps of molded bakelite. Heat is dissipated by a special fan, thus insuring continuity of operation at high speeds. New type radial comutator and built-in switch with sliding contacts save space.

Magnetic Starter

This new oil-immersed magnetic starter of the reduced-voltage, auto-transformer type has all arcing contacts immersed under 6 in. of oil. An induction type temperature



Rating range up to 600 amp. at 600 volts and 200 amp. at 2,500 volts. **General Electric Company**, Schenectady, N. Y.

overload relay provides protection and is also immersed in oil. Either time or current-limit acceleration is available. An ammeter attachment can be supplied if desired.

•

Corrugated Type Fuse

Corrugations around the upper part of this high-potential fuse add greatly to its mechanical strength and increase its insulation value about 30 per cent. Providing

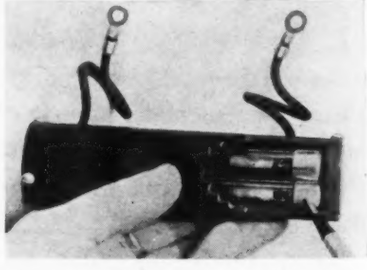
Available for voltages from 66 to 138 kv. **Schweitzer & Conrad, Inc.**, Chicago.

a maximum of reliability on circuits where very high recovery voltages exist, it is claimed these fuses practically eliminate flashovers due to high-voltage surges. Accurate time-current characteristics make them particularly suitable for selective operation.

•

Magnetic Protector Tattletale

Designed to prevent insulation breakdowns in direct-current magnets, solenoids, motors-generators, coils, etc., this neon tattletale is connected across the equipment to be protected. No current flows until the



Operates at 500 volts d.c. **Littlefuse Laboratories**, Chicago, Ill.

voltage, due to self-induced surges, reaches a dangerous value; it then suddenly conducts and shunts out the surge.

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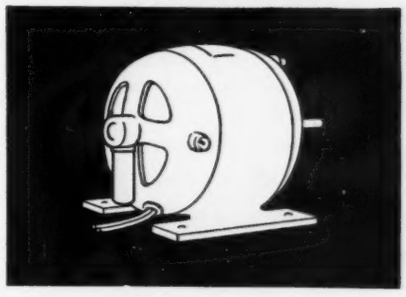
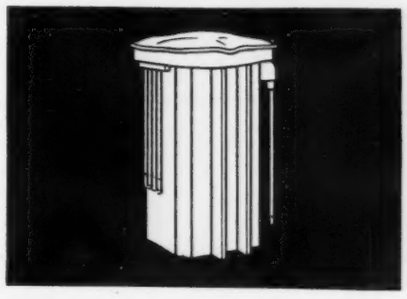


5 GRADES IN COILED STRIP



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THE construction of a distribution line has a bearing on profits—both present and future—that may be just as important as a sale of power or appliances.

The proved record of AmCreCo long term economy is a factor that cannot be ignored in the selection of poles. An AmCreCo pole line will still be rendering profitable service when the line is paid for—contributing its part to profits for years to come.

Judged on annual cost and maintenance charges, AmCreCo poles have an unsurpassed record for economy. These southern yellow pine poles with their ability to resist decay and insect ravages, and to retain the full strength of pine throughout their life, represent the ultimate value in line construction. And they are backed by an organization that has been the leader in its field for more than 30 years.

Why AmCreCo Poles Have Maximum Quality

1. Select southern yellow pine.
2. Incipient decay avoided.
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4. Preservative of known value.
5. Adequate single treatment.
6. Treatment accurately timed to proper seasoning.
7. Full length pressure treated.
8. Unequalled facilities and personnel of the leading producer.

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ENGINEERING DATA FROM MANUFACTURERS

Bulletins and catalogs now available to engineers by manufacturers and associations

Electric Equipment for Power Shovels, a 20-page bulletin, GEA-2015, of the General Electric Company outlines, with pictures, the developments, improvements and advantages of electric power shovel drives.

Industry Standards for Rigid Steel Conduit are available in 8-page bulletin 31-C-62 of the Rigid Steel Conduit Association, 17 E. 42d Street, N. Y. C.

Mercury-Arc Rectifiers for Power Conversion in Electrolytic Plants, bulletin 1168, of the Allis-Chalmers Company, Milwaukee, devotes 18 pages to a discussion of electrical and operating characteristics, applications and advantages of its line of rectifiers.

Principal features, together with construction and design details and wiring diagrams, for the application of "Loop-In" service cutouts are included in a brief bulletin (WL-2) of the W. T. Henley's Telegraph Company, Ltd., London, England.

Specifications, tabulated ratings and dimensions of its hook-operated disconnect switches for outdoor service are given in bulletin 44 of the Pacific Electric Manufacturing Corporation, 5815 Third Avenue, San Francisco.

The Noel Speed Arc Welder is described in bulletin 910 of the Ideal Electric & Manufacturing Company, Mansfield, Ohio. Test oscillograms, tabulated test data, curves and design features, structural details and dimensions are given.

Dimensions, sizes and ratings of lugs and sleeves are tabulated in bulletin 528, published by the Wolverine Tube Company, 1411 Central Avenue, Detroit.

"Everdur" Electrical Conduit, a new product of the American Brass Co., Waterbury, Conn., used in corrosive and hazardous locations is the subject of Anaconda publication E-12. Dimensions and sizes of conduit as well as pictorial groupings of fittings and other electrical equipment made from this product are given.

Descriptions of the structure and arrangement of "Trenchlay," steel-taped parkway, lead sheath and series street lighting cables for direct earth installation are given in bulletin UC-1 of the General Cable Corporation, Perth Amboy, N. J.

New catalog 26 issued by the Benjamin Electric Manufacturing Company, Des Plaines, Ill., includes a large section devoted to illumination design. Covered in this section are recommended light intensities for a large number of commercial industrial applications and many practical instructions for lighting unit uses.

How National switch boxes may be used with all types of wiring systems is described and illustrated in a 12-page booklet released by the National Electric Products Corporation, Pittsburgh, Pa.

Featured advantages of vacuum process lead cable sheath and results of bending tests are in a 4-page pamphlet, No. LS-1, announced by the General Cable Corporation, 420 Lexington Ave., New York City.

Eight new technical bulletins describe the functioning and application of General Electric devices for voltage regulation from station to rural line customer. The series is in a folder, entitled "An Opportunity to Improve Voltage Properly," and marked GES-1142.

LOOK INTO THE SERVICE RECORD
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PROTECTION FOR CABLES

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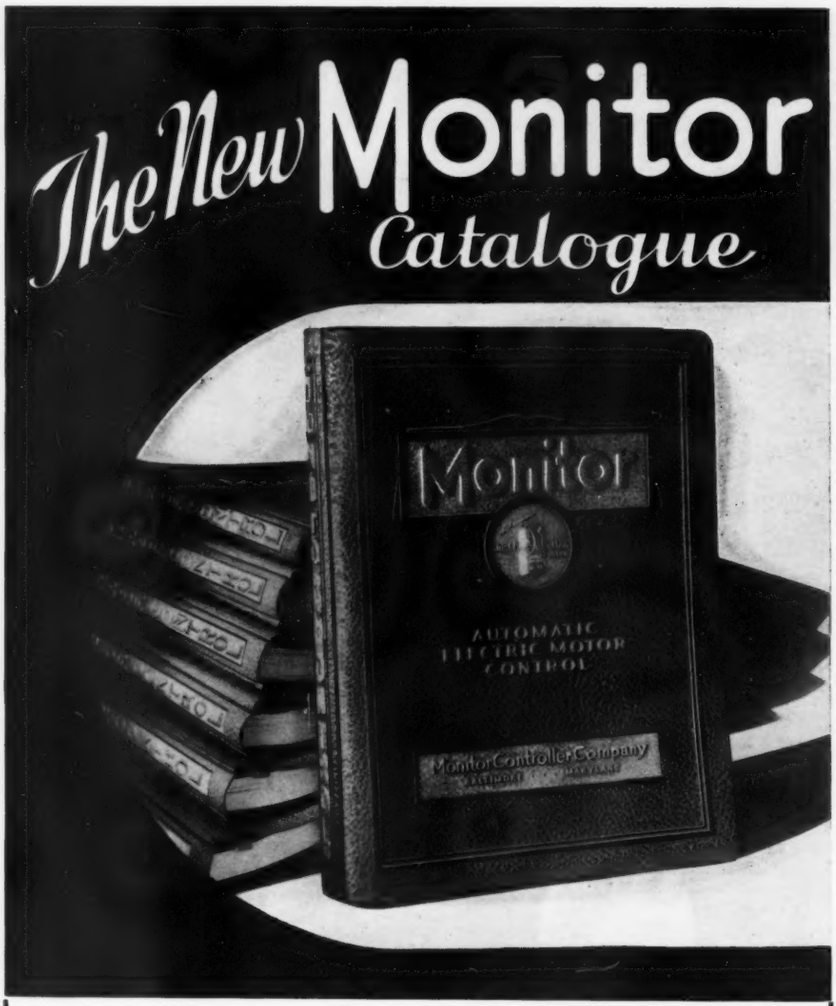

THIS interesting book is filled with illustrations and descriptions of standard controllers, starters and accessories . . . Many new features and improvements in design . . . Useful tables and engineering data. While this catalogue contains bulletins of standard control apparatus only, *MONITOR* specializes in custom built controllers.

MONITOR control problems are almost infinite in number, but the functions to be performed by the controllers fall within a relatively few classifications. For each function *MONITOR* provides standardized unit-parts or elements. By properly combining these elements any control problem, standard or special, can be met.

MONITOR CONTROLLER COMPANY

Gay, Lombard and Frederick Streets, Baltimore, Maryland

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Legislation

Vermont has passed an act providing for the formation of non-profit electric membership corporations and creation of a board of rural electrification.

Electricity is exempted from the provision of the new 1 per cent tax imposed on gross retail receipts in Maryland. The law provides that the tax be imposed on receipts from tangible personal property sold to the ultimate consumer, exempting electricity, gas, steam and automobiles.

By a vote of 117 to 73 the Pennsylvania House approved a bill to give the Public Service Commission power of regulation over holding companies and the right of approval of contracts between operating and holding companies. The Pennsylvania Rural Electrification Authority bill, setting up a board of three which would float bonds for generating and distributing electric systems, has been approved by the House.

Massachusetts Senate has killed a bill to establish a municipal gas and electric plant in Nantucket by a roll call vote of 16 to 15. The opposition to the project asserted that an outlay of $300,000 would be required.

Governor Lehman recently vetoed the Brownell bill passed by the New York Legislature, giving the Public Service Commission the right to order the sale of utility securities with submission of sealed bids if "the public interest so requires."

A measure has passed the Nebraska House transferring from the state Railway Commission to the state blue sky department control of the approval of securities of light and power companies.

•

Rural Balance Sheet

In our June 22 issue a "Rural Electrification Balance Sheet" was published. This was an editorial production to give an idea of the magnitude and economic difficulties that would be faced in a nation-wide program for rural electrification. The only relation that these data had to the Federal Power Commission was the use of some unit data on typical farm projects as given in a report by J. P. Schaenzer to the commission under the date of March 25. The totals were then derived from these data. The balance sheet otherwise had no relation to the commission and this explanation is made to prevent any misunderstanding that may have arisen because of the reference made to the commission in the printed table.

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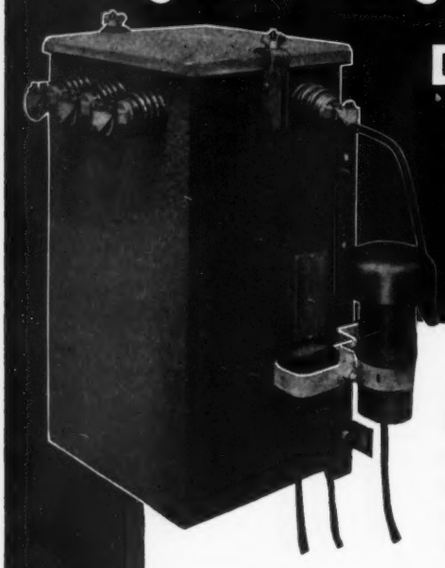
Wagner Surge-Protected Distribution Transformers



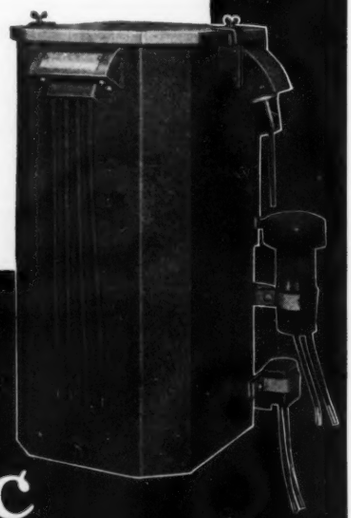
Wagner Surge-Protected Distribution Transformers have these advantages:

1. **Prevents fuse outages due to lightning surges—permits higher standards and continuity of service.**
2. **Self-protected against surge-voltages such as produced by lightning.**
3. **Externally-mounted surge-protecting equipment (valve-type lightning arrestors and isolating gaps)—permits connecting the protective equipment in any desired combination.**

In addition, these transformers embody the same design and construction features of other standard Wagner transformers.

Wagner Surge-Protected Distribution Transformers are available in both the stud-bushing-type and the conventional lead-type, in 2400 and 4800 volt, single-phase distribution classes. The stud-bushing-type surge-protected transformers (illustrated above) are preferable because doubly-protected against lightning, for in addition to the surge-protecting equipment, they have coordinated bushings in which the flashover takes place outside the tank, thus eliminating any flashover within the tank.

Write the nearest Wagner branch for further information regarding these transformers.



Wagner Electric

Motors
Fans
Transformers
Brakes

6400 Plymouth Ave., St. Louis, U.S.A.

T 335-4

SALES OPPORTUNITIES IN NEW CONSTRUCTION

MIDDLETOWN, OHIO — American Rolling Mill Company plans installation of heavy-duty motors and controls, conveyors, electric cranes and hoists, and other equipment in new addition to East Works, for which superstructure will soon begin. Cost $3,500,000 with machinery.

ROCK RAPIDS, IOWA — Has engaged Black & Veatch, Mutual Building, Kansas City, Mo., consulting enigneers, to make surveys for proposed city-owned electric light and power plant. Bond issue of $150,000 for project will be arranged in near future.

PIQUA, OHIO—Plans extensions in transmission and distributing lines for service in three rural districts in this vicinity, expanding facilities of city-owned electric light and power plant. Cost close to $29,000. F. R. Beuchner, city manager, in charge.

LA PORTE CITY, IOWA — Asks bids until July 9 for equipment for proposed city-owned electric light and power plant, including two Diesel engine-generating units and complete accessories, cooling pond, oil tanks, etc. Cost about $100,000. Young & Stanley, Muscatine, Iowa, are consulting engineers.

SOUTH BEND, IND. — Sibley Machine Company plans installation of motors and controls, conveyors, electric hoists, etc., in new plant addition. Cost over $100,000 with machinery. F. D. Chase, Inc., 307 North Michigan Avenue, Chicago, Ill., is architect and engineer.

WISCONSIN RAPIDS, WIS. — Consolidated Water, Power & Paper Company plans installation of motors and controls, regulators, conveyors, etc., in new addition to paper-finishing mill. Cost over $100,000 with machinery.

LOS ANGELES, CALIF. — Metropolitan Water District asks bids until Aug. 20 for steel tower transmission line from Boulder Dam hydro-electric power project of Government to number of pumping plants along route of Colorado River Aqueduct, about 237 miles, estimated to cost $5,000,000. Requirements will include about 6,000,000 lb. 500,000-circ.mil copper wire or equivalent aluminum, and about 6,000 lb. of structural steel for towers. Pumping system will comprise group of five electric-operated stations, each station to have three initial pumping units of 200-ft. second rating, with ultimate installation of nine such units in each plant. Power substation facilities will be constructed to provide service. Financing has been concluded through R.F.C. in amount of $36,000,000 to provide for these and other features of project.

FORT WAYNE, IND. — Joslyn Company has approved plans for new addition to hot rolled bar steel mill. Cost about $160,000. Installation will include a 25-ton capacity electric furnace and accessories, 20-ton electric traveling crane and other electrical equipment.

CASPER, WYO.—Bureau of Reclamation, Casper, asks bids until July 22 for construction of Seminoe dam and power plant for Casper-Alcova Project, Wyo. (Specification 630).

OWINGS MILL, MD.—Owings Mill Distillery Company has approved plans for new

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multi-story addition and soon proceeds with superstructure. Cost about $100,000.

ST. LOUIS, MO.—Will install new electric street-lighting system in district north of Easton Avenue, replacing present gas-lighting facilities. Cost about $75,000. Department of Public Utilities in charge.

PLAINVIEW, TEX.—Plans new electrical distribution system in residential area and underground conduit lines in business district. Cost over $250,000. Proposed to ask bids soon. J. E. Ward, Harvey-Snider Building, Wichita Falls, Tex., is consulting engineer.

TAMPA, FLA.—American Can Company, New York, N. Y., plans installation of motors and controls, conveyors, etc., in new branch plant at Tampa. Cost over $125,000.

CHARLESTON, W. VA. — Kanawha Valley Power Company plans new transmission line across Kanawha River, using steel towers on each side of stream, in connection with extensions in present high-tension system.

SACRAMENTO, CALIF. — United States Engineer Office asks bids until July 9 (postponed from June 25) for three large electric-operated pumping stations for drainage service along easterly levee of Sutter bypass, Sacramento River, including auxiliary electrical equipment (Specification 6757). Estimated cost, $450,000.

KINGSFORD, MICH.—Is completing surveys and estimates of cost for proposed municipal electric light and power plant, acquiring existing distributing system as part of project. Federal Engineering Company, Davenport, Iowa, is consulting engineer.

McMECHEN, W. VA. — Has authorized surveys and estimates of cost for new city-owned electric light and power plant. Financing will be arranged through federal aid. Thomas Cooper, Mayor, is active in project.

KOKOMO, IND. — Crosley Radio Corporation, Cincinnati, Ohio, plans installation of motors and controls, conveyors and other equipment in new radio and electric refrigerator works at Kokomo, where property has been acquired. Cost close to $150,000, with machinery.

PASADENA, CALIF. — Plans installation of motors, controls and other industrial electric equipment in new city-owned machine shop and garage for municipal water department. Fund of $130,000 is being arranged through federal aid.

BEATRICE, NEB. — Southeast Nebraska Public Power District, J. Edward Fisher, Beatrice, secretary, soon completes plans for transmission and distributing lines in Southeastern part of State for rural electrical service in number of districts, totaling about 600 miles. Power substation facilities will be provided in different centers. Fund of $575,000 has been arranged through federal aid. Burns & McDonnell Engineering Company, 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

PORTLAND, ORE.—United States Engineer Office, Customhouse, asks bids until July 10 for lock-operating equipment for Bonneville power project, Columbia River.

PRINCE RUPERT, B. C.—Mutual Pulp & Paper Mills of Prince Rupert, Ltd., recently organized, care of F. L. Buckley, 1030 Hamilton Street, Vancouver, B. C., representative, plans installation of motors and controls, regulators, conveyors, loaders and other equipment in new multi-unit pulp and paper mill in Seal Cove district, where site has been acquired. A power plant will be installed for mill service. Plant will cost close to $1,000,000.

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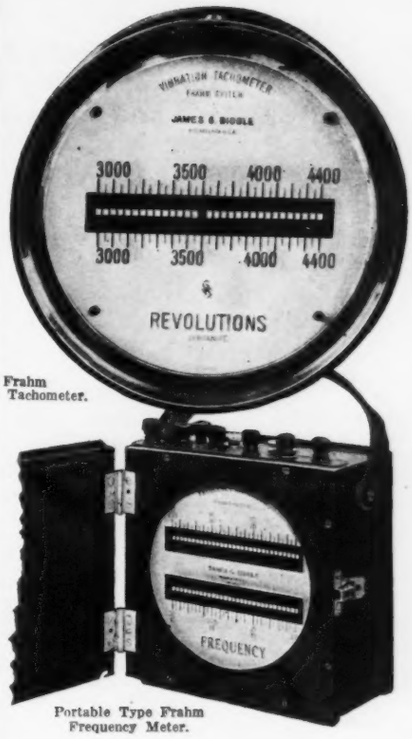

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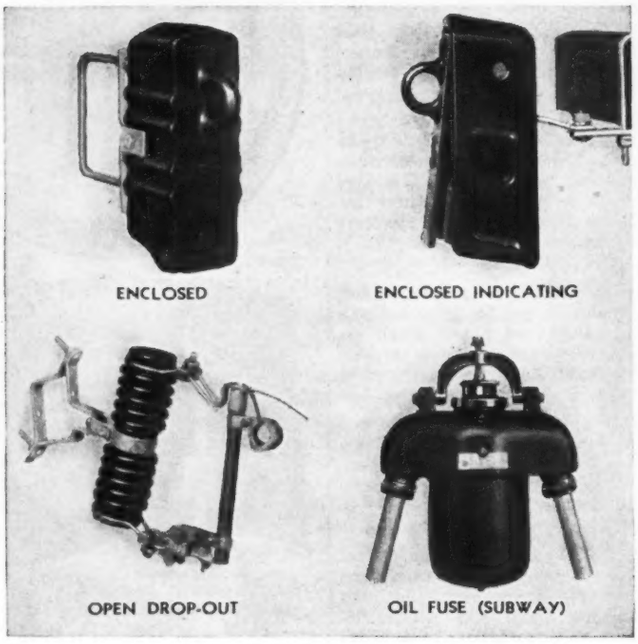

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340-12

GENERAL ELECTRIC

Municipal Items

Disputing the position taken by Governor Lehman that municipal power plants should be operated without profit, Justice Gilbert V. Schenck of the Supreme Court of the State of New York ruled last week in the case of the village of Boonville that a municipality making a profit from operation of its own electric light plant may apply the earnings to tax reductions. The village sought to stay the Public Service Commission from enforcing its order reducing rates until the Appellate Division had passed upon the question. Although the case decided last week applies directly to Boonville, it is also of importance to some 75 New York communities that are operating plants or planning to do so.

•

Iowa City Light & Power Company has offered to sell its electrical producing and distributing property to Iowa City for $1,125,000, or to reduce residential rates an average of 23 per cent if the Council would abandon plans for the construction of a municipal plant. An application for a 45 per cent grant from the P.W.A. for the $917,000 proposed project was made by the city June 17.

•

Gulf States Utilities Company has filed suit in Federal District Court in Sherman, Tex., against the city of Liberty, Secretary of the Interior Ickes and others, alleging the National Industrial Recovery Act to be unconstitutional and seeking an injunction to prevent Liberty from constructing a municipal electric plant. The city applied for a P.W.A. grant of $95,200, which has been granted.

•

Texas Utilities Company has filed suit in Federal District Court for an injunction to restrain the city of Plainview from carrying out its project of constructing a municipal electric light and power plant. A P.W.A. loan and grant was made to the city, totaling approximately $500,000.

•

Galax, Va., has asked for a P.W.A. loan and grant of $582,545 for the construction of a hydro-electric plant at Osborne Shoals on the New River in Grayson County with substations, transmission line and distribution system within the town.

•

Manchester, Conn., voters recently defeated a proposal to purchase the Manchester Electric Light Company and operate it as a municipal plant. The vote was three to one against this proposal.

•

Constitutionality of the new legislative act which allows Albany, N. Y., to enter the power business was attacked in the summons and complaint served on the Albany County Board of Supervisors in a suit brought by two taxpayers. The petitioners sought a permanent injunction

restraining the county from taking any proceeding under the authority of the County Power Act. The petition was dismissed by Supreme Court Justice Schenckard and hearing will be held before the Court of Appeals July 11. The Byrne bill establishing the Albany Regional Light, Heat and Power Authority was signed by Governor Lehman in May.

•

Aledo, Ill., has voted 838 to 555 against the construction and operation of a municipal plant. The Illinois Northern Utilities Company serves the city.

•

San Angelo, Tex., recently defeated a proposal to issue $900,000 of revenue bonds for the construction of a municipal electric light and power plant. The vote stood at 740 against and 573 for the project. West Texas Utilities Company serves the city.

•

Constitutionality of the Simmer Law, which permits Iowa cities to construct municipal utility plants and pay for them out of earnings, was upheld in two opinions of the State Supreme Court recently. The opinions were in the cases of the Iowa-Nebraska Light & Power Company against the city of Corning and the Fairbanks-Morse Company and the Iowa-Nebraska company against the city of Villisca and the Electric Equipment Company.

•

Veto by Mayor Gehan of St. Paul of a proposed $16,965,000 bond issue for a municipal plant was upheld by the City Council recently by a vote of 4 to 2.

•

Middlesboro, Ky., officials are going ahead with plans for issuance of $328,000 in bonds for a city power plant. A decision by the Court of Appeals recently upheld the right of the city commissioners to issue the bonds, a right challenged several months ago by the Kentucky Utilities Company, which obtained an injunction and halted the city's proceedings. The state's highest court reversed the Bell Circuit Court, which had held the city commissioners in contempt for attempting to violate the injunction.

•

Despite court actions to ban the project, the city of Bethlehem, (Pa.) will go ahead with construction of a municipal electric light plant. City Council has passed a bill, providing for acceptance of a P.W.A. loan and grant of $115,000. It also makes provision for repayment of $80,500 of that sum. Meanwhile, the Pennsylvania Power & Light Company has filed two petitions in court at Easton, asking that Bethlehem officials be adjudged in contempt of court for starting the plant. The contempt action grows out of a permanent injunction issued by Judge Stewart of Northampton County Common Pleas Court, restraining city officials.

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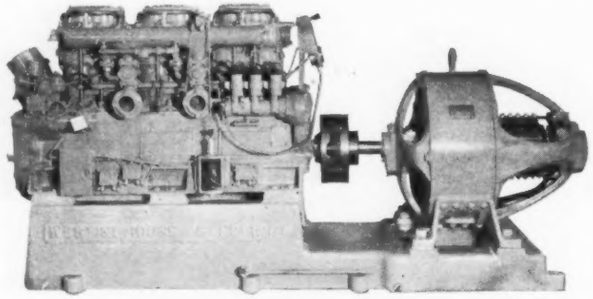

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